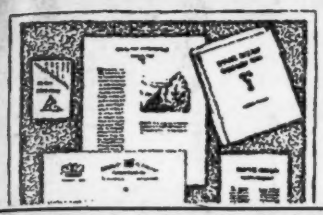
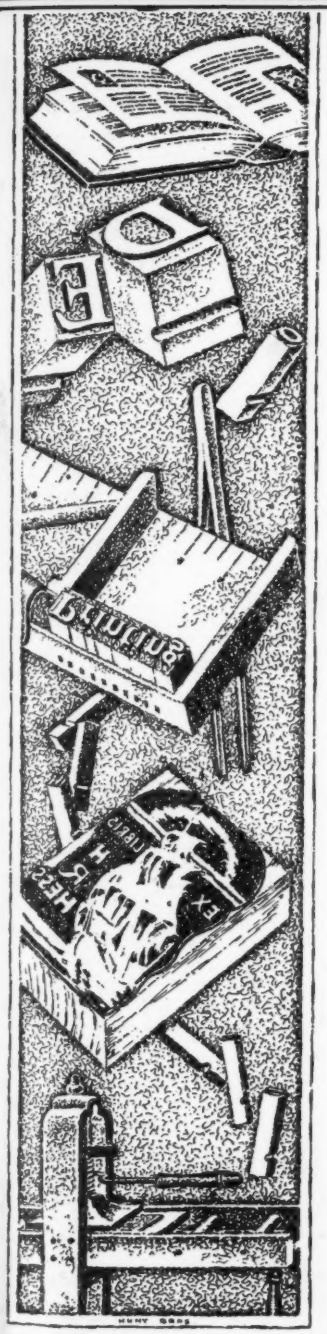


JUNE 1934

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION



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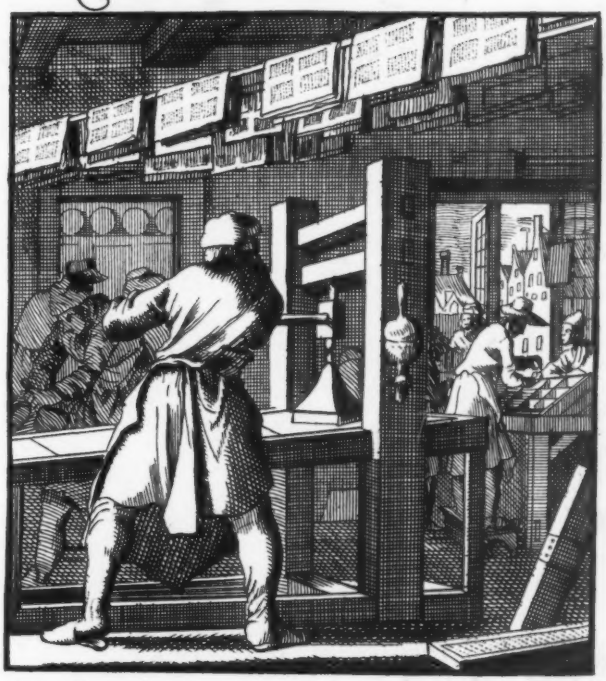

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Die zwarigheid belast me niet.

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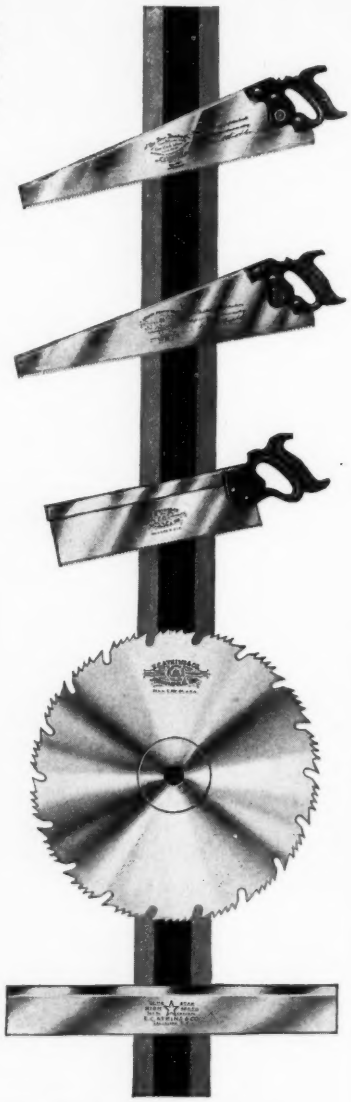

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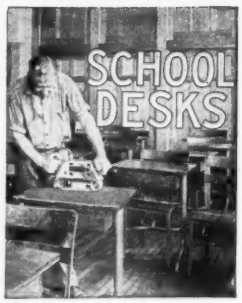

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INDUSTRIAL ARTS and VOCATIONAL EDUCATION
June, 1934
Vol. 23, No. 6

Pewter Craft

Emerson Wm. Manzer

Bronxville Schools,
Bronxville, New York

The advantages of pewter as a medium for industrial-arts work are here recounted by an enthusiast. He does not overlook the historical lore of his favorite craft, either.

PROF. William H. Varnum, of the University of Wisconsin, and author of *Pewter Design and Construction,* was the first person to introduce pewter-craft work into the classroom. A number of years ago he was requested to repair a badly damaged, ancient, fraternity pewter tankard. After considerable experimental work, an industrial product termed "britannia metal" was obtained and used in the repairs so satisfactorily, that no perceptible difference in coloration was detected. This metal was found to be an excellent quality of pewter, closely resembling the material used in the old colonial pieces.

The pleasure that Professor Varnum experienced with this metal led him to introduce it into his art-metal classes at the University of Wisconsin. Shortly after, it was the writer's good fortune to take work in one of his classes and it was there that he got his first experience with pewterware.

Pewter craft is not a new subject from the standpoint of the craftsman, but it is a comparatively new subject from the standpoint of the industrial-arts instructor. Historically it extends back 2,000 years when the ancient Chinese practiced the art. Later years found the Romans and ancient Britons fashioning pewter into articles for use in church and home. The use of pewter in the home started in the palaces of the kings, popes, bishops, and nobility. Edward I (1288), records show, had 100 dishes, 100 platters, and 120 salt cellars, all made of pewter. It was not uncommon to see rooms decorated with this somber gray metal. Howard H. Cotterell, of Croxley Green, Hertz, England, in his excellent book *National Types of Old Pewter,* writes a very interesting paragraph in which he says:

> Before china, earthenware, enameled iron, and other more or less modern inventions had been conceived by man, pewter was reigning in the height of its popularity; back through the days of the early Georges and Queen Anne, on through the Stuart dynasty and the troubled Cromwellian period, and backward through the reign of the Virgin Queen and the days of the bluff King Hal, and still we have not tracked it to its source, for it is still being found in the excavated sites of Roman towns and camps. And even there its roots are not!

So much for the English pewterers. Let us now look at the early colonial craftsmen. It is they who have given us a heritage rich in tradition: colonial architecture, reproductions of early American furniture, handsome rugs, original creations of their own hand. The pewter craftsmen of those early days have left their impressions upon the creative instincts of modern craftsmen, and have indelibly stamped it upon the minds of our people. We revere the memory of those pioneers and because of this affection the things created by them will live with us forever.

Boston and New York were the chief centers of manufacture, the former leading in this endeavor because the settlements around New York consisted chiefly of traders. Hartford, Connecticut, Providence, Rhode Island, Philadelphia, and several other eastern cities can boast of their early pewterers, according to the earliest reference found in connection with them as active manufacturers.

Some of Thomas Bumsteed's work is dated, Boston, 1654, while several early New York pewterers are dated 1786.

Edward J. Gale, in his *Pewter and the Amateur Collector,* lists 44 early American pewterers. "The manufacture of pewter in America," quoting Mr. Gales's book, "practically ceases in the first quarter of the nineteenth century, although examples may be found dating from 1825 to 1840."

Pine cupboard garnished with pewter. Photo courtesy Museum of Fine Arts, Boston, Mass.

Shakespeare, in his "Taming of the Shrew," Act II, mentions pewterware as a household necessity. He had Gremio telling of his house in Padua:

> First, as you know, my house within the city
> Is richly furnished with plate and gold:
> Basins and ewers to lave her dainty hands;
> My hangings all of Tyrian tapestry;
> In ivory coffers I have stuffed my crowns;
> In cypress chests my arras counterpoints,
> Costly apparel, tents, and canopies,
> Fine linen, Turkey cushions boss'd with pearl,
> Valance of Venice gold in needlework,
> Pewter and brass, and all things that belong
> To a house or housekeeping:

The history of the Worshipful Company of Pewterers of the City of London dates back to 1348 when the first ordinance was made for regulating the craft of the pewterers. From that period to 1863, one can find very interesting information about these fabricators of metal. To compare their regulations with the regulations of the modern labor unions is indeed enlightening. The custom among these early craftsmen was to have different classes of pewterers do different kinds of work. For example, there were "sad-ware-men," "hollow-ware-men," "spoonmakers," men who made pewter lids for earthenware pots and jars, and men who specialized in making pewter spiral "worms" for stills. Itinerant pewterers went about the cities just as our scissors grinders do today. They carried their molds made of gun metal with them, and if some misfortune had come to an old piece of pewterware, it was remelted, recast, and repaired without further ado right at the front door.

The foregoing shows that pewter craft has a background which is extremely rich in historic ideals. These should be of untold value in coördinating the work of the shop with the other general educational subjects. Let us, for example, take the social studies. If we are to have our boys and girls study the life of people during certain stages of civilization, why not let those who are taking work in pewter craft, study something about the craftwork done during these periods? It will be of value to all students of the social subjects. Would it not be interesting to have several students compare the Pewterers Company of the City of London with the labor unions of today? Why did the craftsmen make certain kinds of pewterware? For example, the hot-water venison dish, during the eighteenth century; the oil lamps of the seventeenth and eighteenth centuries; pewter maces; the communion cup of the late sixteenth century. All of these articles were made for a definite purpose; that is, to satisfy the demand of the time.

Examples of pewter work made in the school shop

It would be quite instructive for students to write an English theme about some of the old domestic and ecclesiastical pewter. Let me cite one example: the enshrined hearts. This is taken from Major C. A. Markham's English book, *The New Pewter Marks and Old Pewter Ware*. Mr. Markham says:

> During the Middle Ages it was a usual custom to embalm the heart of a warrior, ecclesiastic or other illustrious person; to encase it in silver, lead or pewter; and then to bury or enshrine it in some church or religious house, far from the spot where the deceased breathed his last. The heart of many a warrior, dying

on the field of battle, has been removed from his body, and carried back to his home by his attendants. In other cases, those who were not able themselves to go to the Holy Land, directed that after their death their hearts should be embalmed, taken thither, and buried at Jerusalem.

Correlation of this type is being done at present, and because of it the industrial-arts work is becoming a more integral part of general education. The possibilities for many kinds of correlation are almost limitless, the success of any course being in proportion to the amount of energy and thought that is given to the organization of the subject matter. That interest is thereby added to any shop course is, of course, apparent.

The industrial-arts instructors have been charged with specific duties by an educational jury in the fields of general education and of the industrial arts. Industrial-arts work is being recognized as an integral part of the present educational setup, and as such it has been assigned specific duties. Its task is to provide the youth of America with junior skills, appreciations, attitudes, avocational and educational guidance, and to assist in conducting them into the larger responsibilities of adult life.

The late Dr. Frederick G. Bonser, in an address before the industrial-arts section of the Central Ohio Teachers' Association at Columbus, Ohio, said:

> Industrial arts contributes to that growth which makes for improved health; it contributes to growth in living with reasonable and wise economy; it contributes to growth in good taste, thus increasing the beauty of life and its surroundings; it contributes to the development of wider interests and a more enlightened understanding of the complex life of this scientific and industrial age; and it contributes to a growth of social understanding and appreciation in an era of interdependence as world-wide as the distribution of the human family.
>
> It contributes much that in the very best sense is cultural and liberal. It opens avenues of interest, understanding and appreciation for much of the best that has been thought and done as found in the fields of literature, history, art and music.

The subject of pewter craft may be successfully used as a motivating factor in fulfilling the requirements that have been set up. It will give the student much that is cultural and liberal in the very best sense; it will contribute to growth in appreciation-consumer values; it will contribute to the beauty of one's home and its surroundings; it will provide a basis for a future hobby and thus open avenues of interest, understanding, and appreciation of skilled labor. Pewter craft will ultimately find its place in the exploratory courses of the junior high school, either as a phase of the general shop or as a unit in itself. Advanced work, taken after the junior-high-school exploratory course, calls for creative art and design that will prove a rare opportunity for correlation between the art department and the industrial-arts shop of the senior high school. No other industrial-arts subject permits of a closer relation with art. Design classes will find practical application for their efforts. They will come back to the craft classes with a keen desire to create in metal the product of their efforts in the art department. Their efforts may take the form of a clay model for a book end which will later be cast in metal; a design for a chased top of a powder-puff box; a candlestick with beauty in line and form, or perhaps some other designs that have been evolved by the stimulation of their imagination made possible through the knowledge of pewter-craft processes.

Pewter craft as a medium of expression has proved to be within the ability of the junior-high-school student. The work that has been done in numerous schools is sufficient proof that commendable work can be done under proper direction and with methods adapted to schoolwork. The processes used by the junior-high-school student have been so planned that most everyone can do a good job. The big objective may be summed up in two words, *resulting satisfaction*. This may be in terms of tool manipulation — successful efforts with new processes and materials, and the creation of a project that combines beauty and utility and achieves it all at low cost.

If the shop teacher can give his boys and girls an appreciation of their own capacities through successful efforts, he has partially eliminated one cause for failure — the inferiority complex. Resulting satisfaction in pewter craft is almost assured because of the ease with which the metal can be worked; the fact that the tools and machines used can be operated by the students themselves; and because the projects are most welcome in the home. It is quite common to have the student come back with orders for more projects. This fact assures the instructor that his work is being accepted by the parents and that he has won their support for his shopwork. Industrial-arts work needs this support now more than at any other time in its history.

The processes that are common to metal craft are not found in other industrial-arts courses. They are relatively easy for the student to perform, and in most cases, he can do all the work without any physical assistance from the instructor. This frees the instructor and gives him more time for actual supervision, individual instruction, and direction of other class activities.

Some of the processes common to metal craft are metal sawing, beating down, planishing, spot-hammering, raising, etching, coloring, electroplating, soldering with blowpipes, and numerous other processes that may form the basis for a hobby to pursue at home. Little equipment is necessary for this work and the cost of the material is small; two more factors that favor pewter work as a home industry or hobby.

The time element has much to do with the success of any project. The average interest span of the junior-high-school boy or girl is rather short. They enjoy doing things quickly so that they can enjoy the fruits of their labors. A good-looking pewter plate, for example, can be finished in three one-hour class periods. A nut scoop and nut dish can be completed within a week. A good pair of book ends will take the average student about 8 periods. This means that a student can complete many projects during a semester of work. His parents are proud of his work, they show it to the neighbors, and indirectly supporters for the industrial-arts work are being cultivated in the community.

Every school administration is thinking about this item today. The cost of pewter compared to wood and other materials, is, according to information gathered from instructors who have taught both subjects, considerably lower. The cost for pewter-craft work for a semester is about $2.50. This is sufficient for making a number of articles. Compare this with the cost of wood. What does a board foot of black walnut or mahogany cost? What can be made from one board foot? What can a student make from pewter that costs the same as one board foot of wood? A 10-in. dinner plate, for example, costs about 40 cents. A small nut dish and spoon costs about 25 cents. A candy box will cost about 35 cents. An ash tray, well made and good-looking, will cost 10 cents. A salad plate costs 30 cents.

Comparing the cost of pewter with that of leather, it is found that it is much cheaper for the student to use pewter. A wrought-iron lamp made in the general metal shop, with its lamp cord, socket, and plug, costs about 75 cents. How long will it take to make a wrought-iron lamp? How many pewter-craft projects can be made for the same cost? How will the time compare for the same projects?

This comparison of costs is made to show that pewter is inexpensive. It is somewhat more expensive than copper, but the beauty and quality of pewter projects are superior to those made of copper. Furthermore, the student will be able to handle the softer metal with much greater resulting satisfaction than the harder metals that have to be annealed and reannealed while being fashioned to the desired shape.

How Do You Teach?

Verne C. Fryklund

University of Minnesota,
Minneapolis, Minnesota

A rating scale for evaluating a teacher's performance, admirably suited for both supervisory and for self-evaluation.

AN EFFECTIVE method of shop teaching must necessarily be conceived in terms of a philosophy and a psychology of education. Therefore, a rating scale, or any device for evaluating a teacher's performance, should assume an underlying philosophy and a fundamental psychology. A set of good points to be used as a check list would be inadequate as an evaluating device. Rather, there should be word patterns descriptive of known teaching situations ranging from almost utter ignorance of educational values on the part of the teacher, to a method which is highly acceptable because it embraces a well-conceived educational plan.

A sound philosophy and a good psychology closely parallel each other in their educational functions. Included in the conception of an acceptable philosophy there must be *aims* in order that direction may be given, in general and in particular, to the functioning of a curriculum or a given course of study. A philosophy of education would be lacking in true value, there could not be a real philosophy, unless aims were embraced within its perspective. Aims give direction; they suggest the content of courses and the method of teaching to be used in realization of the desired educational pattern.

The psychology of learning lends effectiveness and accuracy to teaching. It, too, is of value in choosing the right method of teaching and in limiting content within the requirements of individuals. Coupled with philosophy it adds refinement to the whole educational process.

An effective method of teaching should include a definite plan for measuring results. Such a plan must function in specific measurement of pupil achievement in the manipulative and related instructional units, and it must comprehend evaluation of the teacher's success. Therefore, a philosophy and a psychology must also underlie the plan of measuring results.

In a good teaching plan there must be evidence of the most modern and acceptable practices in course organization. This suggests analysis and synthesis of aims and activities in order that allotment of duties may be made to each subject so that it contributes in the highest possible degree to the realization of the aims of education.

Whatever the philosophy and whatever the particular kind of psychology which a teacher accepts and uses in order to form his working patterns, he must keep in mind that he is living in an exceedingly dynamic age; a fast-moving age of increasing wonders. One needs to know how to think, as well as to know just what to think, because creative thinking characterizes the successful individual. Any plan of teaching to be satisfactory must provide for the development of self-reliance in individuals who are capable of such development.

Inasmuch as it is now common knowledge that there are differences in all known human traits including ability to learn, provision must certainly be made for individual instruction; it must not be a creature of the imagination. Individual instruction should not be understood as being a mouth-to-ear process, however, but rather it means that every conceivable device for imparting information must be used. A variety of stimuli should be present in order to increase the chances for the individual to learn. Well-written and well-illustrated instruction sheets are indispensable in the repertoire of good teaching devices.

A systematic plan of guidance must be included in the effective method of teaching in order to completely inclose the educational perspective. Guidance, begun in the earliest grades and continued through high school, provides an integration of subjects that cannot be realized more fully through any other means. As soon as integration is thought of, educational and vocational guidance comes to mind as the best avenue for its realization.

A method for evaluating a teacher's services should be conceived so that it may serve as a means of self-evaluation as well as serve as the supervisor's instrument of evaluation. Those who are trained in the specialized observation necessary to evaluate good teaching, know that each particular device that insures good teaching is just another means of securing the links in an educational chain held together only tentatively by a philosophy and a psychology of education. The following descriptions of actual teaching situations have been arranged into several levels from low to high. The latter is supported by an accepted philosophy and psychology of education; it is the highest level conceived by the writer and many experienced teachers in summer-session training. It is a self-evaluating device based upon teaching situations that really do exist. Study it and determine the level in which you find a place.

If, after careful study, you should find yourself belonging in one of the lower levels, plan a procedure for self-improvement that would place you in one of the higher, if not the highest, level of teaching. Self-evaluation and subsequent improvement meet the highest supervisory approval and they lead to occupational security. They add just that much more assurance to the continued existence in the curriculum of the subject which you are teaching.

Level I

A series of joint exercises constitutes the work in this shop and the pupils who complete the series according to standard may make a simple project that may involve one or two of the exercises. No instruction is given in design, finish, and methods of construction. Some manipulative instruction is given. No progress records are kept. Equipment is kept in fair condition. Order is maintained at all times, even though with some difficulty.

Level II

This shop is kept by a teacher who requires that the boys perform a few tasks which are not functional to specific aims. He does not hesitate to perform part of the work for the boys when necessary. Attention is not paid to upkeep of equipment. The completed projects might be improved in design, finish, and construction since no instruction is given in these essentials. The pupils turn to the teacher for every aid — or another condition may exist simultaneously — the pupils proceed without guidance; and the teacher secures good order. Materials might be used differently, no progress records are kept, and no learning units are visible.

Level III

This shop is in a community unlike other communities and therefore there is little in books that could be of service to the teacher. It is not clear, and seemingly not important, as to what the pupils should learn and what they should do. The teacher tells them each time how things should be made and readily attaches annoyers when there are mistakes. There is little teaching of manipulative processes. The choice of projects is rather narrow; in fact, some very good jobs constitute the repertoire of projects, and they are used. A good finish is obtained on the jobs either by the pupils, or by the teacher, if the pupils cannot do it. The equipment could be kept in good condition if there was more time available. This shop is kept by one who apparently does not appreciate aims and the educational outcomes of shopwork. No progress records are kept and no learning

units are visible. Discipline is very important and it is secured.

Level IV

This shop is in charge of a teacher who believes that certain fundamental processes must be taught to the pupils. He is more or less indifferent about aims or outcomes; educational philosophy and psychology are rather vague remembrances of his training period. He keeps his shop in good condition, and keeps the tools sharp. He demonstrates the manipulative processes to the group from time to time, and keeps good order. There are no progress records. The pupils are marked on the completed jobs. The jobs "turned out" are very good; they are typical. The teacher does not give thought to the emphasis of instruction with respect to operations and jobs or projects. There is little use of books or reading material. There is no instruction given on related information, judgment forming materials, and guidance information. There is no creative work in which the pupils can plan their own procedures before making a project. This is a good shop as compared with some shops, and "straight" shopwork is taught.

Level V

This instruction is based on an appreciation of psychology and a philosophy of education. Good group demonstrations are given from time to time. The value of related information and the guidance value of the subject are recognized. Time is devoted to these topics, at least as much as the manipulative shopwork permits. The tools and shop are kept in good condition. Grades are based on the finished product, and objective tests on the informational side of the work are given. The pupils do not plan procedures for jobs, and the jobs are quite typical. There is a bookshelf, and some use is made of job sheets. The teacher may not be satisfied that the job sheets meet his needs. The principles underlying a good instruction sheet are not clear to him.

Level VI

This shop instruction is guided by a working knowledge of psychology and a philosophy of education. The aims of general education and the aims of industrial education are considered in the planning of the work. It is believed that the operations must be taught by the teacher, and that the learner is responsible for doing the jobs. There is no planning of procedures for jobs, however, as far as the learners are concerned. The equipment is kept in good condition. The value of related and guidance information is recognized and time is devoted to it. The teacher grades on the finished product and gives objective tests on related information; he gives good demonstrations and individual follow-up demonstrations. He has a good shop library composed of many books on related information as well as books on manipulative method. He is interested in individualizing instruction, and seeks to bring this about without lessening the value and importance of good group oral and individual oral instruction. He feels that good instruction sheets would help him to greater success in his instruction.

Level VII

Instruction in this shop is carried on by a teacher who fits into Level VI. But he grades on the operations, rather than on completed jobs. Originality is shown in projects. A record chart is kept of the operations learned. Instruction sheets based on operations are used, and the value of work reading is recognized. Oral instruction is supported by good written instructions on both manipulative processes and in related information. Examples of good workmanship are exhibited. The pupils are not taught to plan the procedures for their jobs, as must be done by those who do things and create things; there is little problem solving. Discipline is secured without effort. An organized industrial personnel is included in his plan of training.

Level VIII

The teacher of this shop fits well into Level VII and appreciates the informational content as being fully as valuable as the manipulative content; but he does not exclude manipulative work in his anxiety to teach related information. Both manipulative and informational content are taught. He wants learners to develop self-reliance, and initiative, and he understands that good instruction and past experience are needed in developing creative ability. Discipline is good and readily obtained. The pupils see in their teacher an ideal worth following. He realizes also that young folks should be allowed to develop initiative, self-reliance, and creative ability by requiring them to plan a careful step by step procedure for every job they attempt in the shop.

Portable Sound Amplifier

Francis J. Coyte

Clifford B. Connelley Trade School, Pittsburgh, Pennsylvania

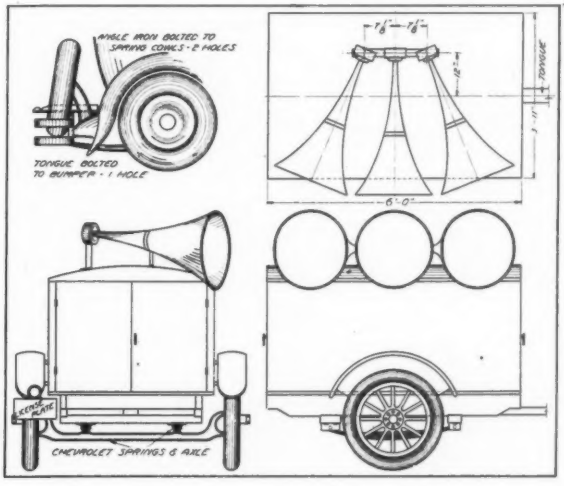
A piece of apparatus built by vocational students, which has been helpful on many occasions. The sound amplifier has done much to popularize vocational education with the students and with those who attend the various student activities where the amplifier is used.

THE portable sound amplifier described herewith is built up with three horns on the roof, a built-in power plant, an extra room for amplifier equipment and other paraphernalia, all mounted on a trailer.

The drawings for the project were made in the drafting department; the automobile shop supplied the Chevrolet front axle, wheels, springs, and tires; the machine shop constructed the brackets, clevices, chassis, fastenings, and coupling units; the auto service shop overhauled the power plant; the welding shop made fast the axle spindles, revamped two old Ford fenders and made the "T" shaped automobile connector bracket; the millroom cut out the wood chassis, body rigging, roof ribs and top; the carpentry shop floored the cab; and the sheet-metal shop covered the cab sides and also covered the wood door frames. The assembly of the body, roof horn brackets, roof covering, switchboard wiring, and installation of the gasoline engine was done by the students of the radio shop. The painting was done in the wood-finishing shop and the lettering of the school name and radio-station call letters were put on by students from the commercial-art shop.

Much credit is due the individual shop instructors for their part in completing the project and to our vice-principal, Mr. J. W. Fleming, who assisted the work in every way, and scheduled the project through the various shops.

Since the trailer has been completed, many uses have been made of the sound equipment both outdoors and indoors, de-



Assembly of portable sound amplifier

pending on the set-up and nature of the occasion. A list of events are as follows:

Outdoors: Corner-stone layings; grade-school track meets; junior-high track meets; senior-high track meets; final city-championship meets; pageants; intra-mural school meets; flag-raising exercises; community football games and polo games.

Indoors: Dedication of buildings; stage plays.

The portable sound amplifier can also be used for the following occasions: Community carnivals, outdoor swimming meets, advertising school activities, farm-products show, and school fairs.

The flag-raising exercise at Connelley Trade School, Figure 1, shows the amplifier in use making it possible for the entire student body and others to hear every word spoken by students and faculty alike.

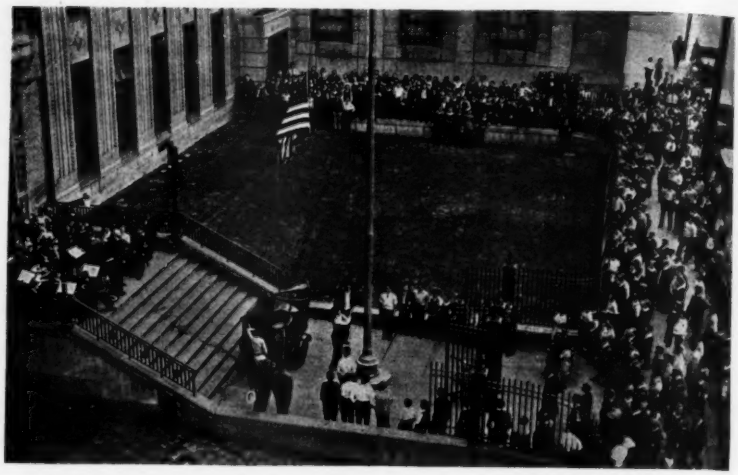


Fig. 1. Flag-raising exercises at Connelley Trade School, Pittsburgh, Pa.

Figure 2*a* shows a grammar-school district meet, with the amplifier in use, the crowd in the stands, the starting line, the finish line, the telephone communication system to the announcer and the orderliness of the student body. The customary milling around and listlessness of the spectators is avoided by informing them instantly as to the nature of the event, the name of the winner and the points scored by each school as the meet progresses.

The problem of discipline and orderly dispatch of the track meets using the amplifier has brought forth a statement from our director of hygiene, Dr. H. B. Burns, who said: "Sound amplification is the most useful contribution to our school athletics in twenty years."

The mechanical details and physical dimensions of the cab are shown in Figure 3. Since the shop doors would permit full car width and a height of six and a half feet, the body was built so that the loud-speaker horns would clear this height.

Coupling the cab to the automobile requires about two minutes and is accomplished by moving the cab into the shop driveway, engaging the couplings and then inserting a $\frac{5}{8}$-in. bolt through the tongue and drawbar. A stout cotter pin is then inserted through the free end of the bolt. When the cab is detached from the automobile, the folding leg is dropped to form a rigid support. Two students can easily manipulate the cab, which weighs about 400 pounds fully equipped, in and out of the shop entrance.

Usually the sound-amplifier trailer is drawn to any point in the city by the radio instructor's automobile. The apparatus

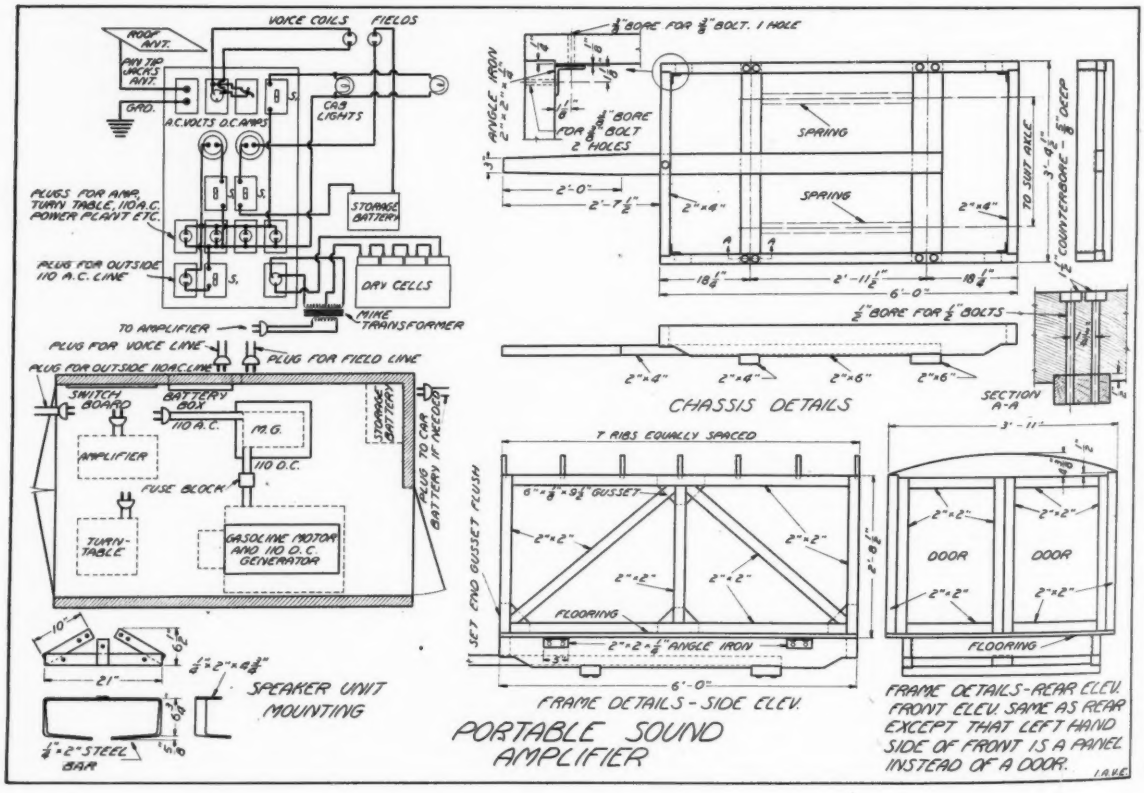
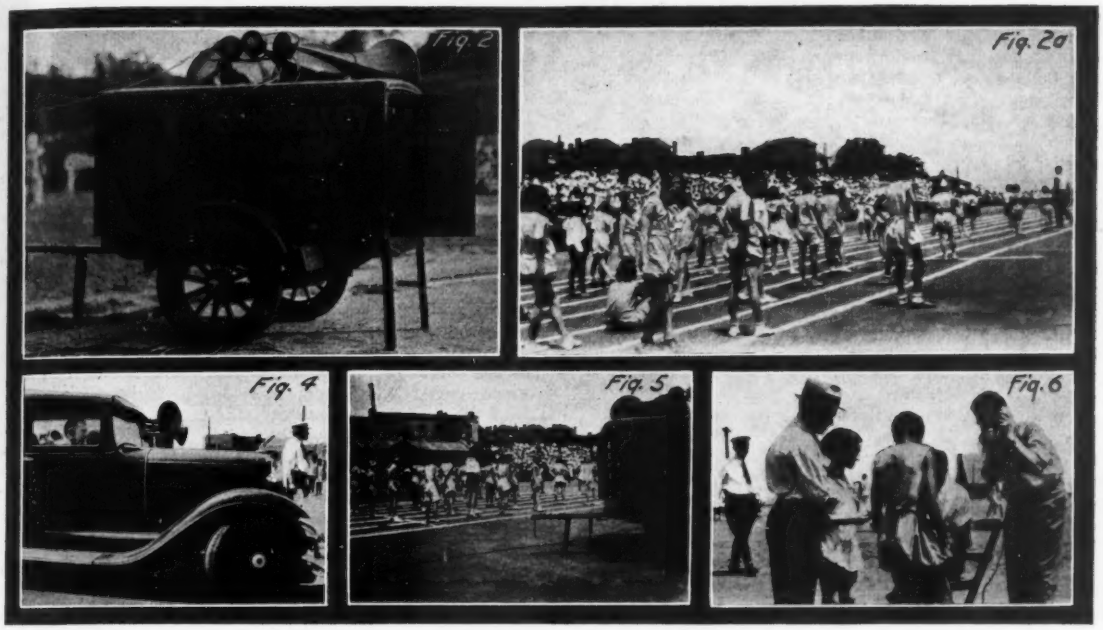


Fig. 3.



Figs. 2, 2a, and 5. The amplifier in action. Both ends of the field are in constant touch with one another, eliminating misunderstandings of signals and the customary bellowing of megaphones. Fig. 4. The instructor at the mike. He is facing the field and watching for every touch of human interest to liven up the broadcast. The track and field are kept clear of spectators. The student activities are directed through telephone communication to both ends of the field. Fig. 6. The finish line where the winners report to the tally clerk. As the names of the winners are received, the instructor at the phone passes the information on to the announcer in the official sound car, from where it is then broadcast to the audience and the participants

is always operated by students from the radio and telephone departments, who are directly responsible for its maintenance and care.

The sound equipment used in the trailer consists of the following:

1 Silver Marshall sound amplifier, No. 692, 15-watt.
1 Western Electric reproducer, No. 201A.
1 Western Electric microphone, No. 387W.
3 Racon trumpet horns, 3½ ft.
3 Western Electric speaker units, No. 555.
1 Fairbanks Morse lighting plant, 750-watt.
1 Storage battery.
4 Dry cells for microphone.
1 Switchboard (shop constructed).
1 Fader panel (shop constructed).
2 Hand telephones and batteries.

Terms Used in the Drafting Room

This list of words will be found helpful in both architectural and mechanical drafting. It will be of assistance also in correlating drafting with the other subjects in the junior- or senior-high-school curriculum.

abscissa
accelerated
acme thread
acute
addendum
adhesive tape
adjacent
adjustable
adjustment
air space
alcove
allowable
alloy steel
alphabet
altitude
anchor
angle iron
angle plate
angles
angle valve
anneal
apex
approximate
approximation
apron
arc
arc lamp
arch
architect
architectural
architrave
area
arrowhead
art gum
assemble
assembly
assume
assumption
auxiliary
axes
axis
axle
babbitt
back filling
back putty
ball bearing
balloon frame
baluster
bar
baseboard
base circle
basement
base plate
bat
bathroom
batten
bay
beam compass
bearing
bed molding
bedroom
belt tightener
bench grinder
bending moment
Bessemer steel
bevel
beveled siding
bichromate of potash
bid
bill of material
bisect
bisector
bleaching
blind
blind stop
blocking in
bloom
blue print
blue-print frame
bolster strap
bolt
carriage
expansion
eye
hexagon-head
lag
machine
stove
square-head
toggle
U
bookcase
bore
boring mill
boss
bow compass
bow divider
bow pen
bow pencil
box bearing
box girder
box sill
brace
braced frame
bracket
brake
brake shaft
break
breakfast nook
breaking load
brick
brick bond
brickwork
bridge
bridging
Briggs standard

broach
broken line
bronze
bronze bushing
building paper
bungalow
butt
buttered joint
button head
cabinet
cabinet drawing
cable
calcimine
calcimining
calculate
calculator
caliper
cam
cap
cap screw
carbon
cased opening
caseharden
casement window
casing
casting
castle nut
catalog
ceiling
ceiling joist
cement
center
center distance
center line
center of gravity
chamfer
channel
characteristic
chart
check
checking drawings
chill
chimney
chord
chordal thickness
chuck
chute
cinder
circle
circular pitch
circumscribe
civil engineering
clamp
clamping bar
class
classification
clearance
clevis
closet
closure
clutch
coarse thread
coefficient
coincide
coincidence
cold rolled
collar
colonial
column
common bond
common rafter
commutator ring
comparative
compasses
competitor
composition roof
compound rest
concentric
concrete
cone pulley
conical head
conic sections
connecting rod
connection
construct
construction
contour
contractor
conventional
conventionalized
converge
conversion
conveyor
copper
copy
corbel
corbeling
cored
core print
corner board
cornice
cosine
cotangent
cotter gib
cotter key
counterbore
countersink
coupling
cove
crankshaft
crayon
crosshatching
cross-lap joint
cross-section paper
crown molding
crucible steel
cube
cube root
cup
cupboard
curvature
curve
curved surface
cutting plane
cycloid
cycloidal
cylinder
cylindrical
dampproofing
dead center
dead load
decimal
dedendum
deflection
depth
depth of tooth
design
detail
development
diagonal
diagram
diametral pitch
differential indexing
dimensioning
dining room
distorted
divide
division line
door stop
dotted line
double-hung sash
dovetail
drafting machine
drafting tape
drain
drawing board
drier
drill press
drip cap
drip mold
drive shaft
Dutch Colonial
  dwelling
eave
eccentric
edge angle
efficiency
elbow
  four-piece
  three-piece
  two-piece
element
elevation
ell
ellipse
end lap joint
engine
engineering
English
English bond
epicycloidal
equilateral
equivalent
erase
eraser
erasing shield
estimate
exact
excavation
exhaust
experiment
explanatory
exponent
extension
extension line
exterior
extreme fiber
eyebar
eyebolt
face angle
face cam
face mark
faceplate
facia
factor of safety
faulty
feather key
feet
fiber stress
fillet
fine thread
finish
  all-over
  file
  grind
finished floor
fireplace
fireproof
firestop
fit
fits
  close
  drive
  force
  free
  loose
  medium
  press
  push
  running
  shrink
fitting
flange
flange coupling
flashing
flat fillister
Flemish bond
flexure
floor plan
flue
flue lining
flywheel
footing
foreshorten
forging
forging drawing
formula
foundation
foundry
fraction
frame
frame building
framing lumber
free-hand
French curve
French door
friction
friction bearing
friction clutch
frieze
frost line
frustum
fulcrum
full
function
funnel
furnace
furniture drawing
furring
gable
garage
gauge
gear
  bevel
  blank
  cutters
  differential
  epicyclic
  guard
  helical
  herringbone
  internal bevel
  internal spur
  planetary
  ratio
  screw
  spur
  worm
gearing
  compound
  simple
geometrical
geometry
gib key
girder
gland
glass
glaze
Gothic
Gothic letter
grade line
graph
graphic
gravity
grill
grinder
grip
guide line
gusset
gutter
half
handbook
hand hole
hand rail
handwheel
hanger
harden
hardware
header
header course
head room
headstock
hearth
heat treatment
helical
helix
hexagon
hinge
hinged sash
hip
hip rafter
hole
hollow sleeve
hollow tile
horizontal
housing
hypothenuse
I beam
inches
incline
inclined
indexing
inertia
ingot
ingot steel
ink
inscribe
interior
interior trim
intersection
invisible
irregular
irregular curve
isometric
isometric drawing
jack
jack rafter
jamb
jamb
jamb nut
joints
  butt
  cross-lap
  lap
  riveted
joist
key
  feather
  flat
  gib
  seat
  square
keystone
kitchen
knock-off
knurl
lap
lap seam
lateral
lath
lathe
  bench
  power
  speed
lattice
laundry
lavatory
laying out
layout
lead
length
lettering
lettering pen
level
lever
limits
line
  border
  center
  construction
  dimension
  extension
  projection
  reference
  section
  witness
linear
line of action
line of force
liner
lining
link
linoleum
lintel
live center
live load
living room
location
lock nut
lock washer
logarithm
logarithmic
logarithmic functions
longitudinal
lookout
loop
lythoprint
machine
machine screw
machine steel
major axis
manifold
mantel
mantissa
marble
mark
masonry
matched siding
material
maximum load
measurement
measuring chains
measuring tapes
mechanical
medicine cabinet
metal corner
metal hanger
milling cutter
millwork
minimum span
minor axis
miter
model
module
moisture content
mortar
mullion
multiple threads
muntin
natural functions
neutral
newel post
nogging
nonbearing
nosing
notch
oblique
oblong
obtuse
odontograph
offset
open hearth
open-hearth steel

opposite
order
ordinate
orthographic
orthographic projection
oscillator
outline
outside diameter
oval fillister
overhang
panel
parabola
parallel
parallel line development
parallelogram
parallel rules
partial assembly
partial section
parting stop
parting strip
partition
pattern
pattern drawing
pedestal bearing
pen
penciling
pencil sharpener
pentagon
perpendicular
perspective
photostat
pictorial
picture
picture molding
pier
pilaster
pin
pinion
pipe
pipe fitting
piping
piping layout
piston
piston displacement
pitch
pitch circle
pivot
plain
plan
plancher
plane
plane of projection
planimeter
planograph
plaster
plate
plates
plug
plumb bob
plunger
pointing
polishing
polygon
polyphase
porch
portable
positive
positive action
post
Pratt and Whitney key
preliminary assembly
principle
print
blue
Ozalid
sepia
Van Dyke
printing
prism
problem
profile
profile tooth
progression
arithmetic
geometrical
properties
proportion
proportional
proportional dividers
protractor
pulley
pump housing
punch
punch holder
punch press
putty
pyramid
quadrant
qualifications
quarter
quarter round
quarter section
quoin
rabbet
rack
radial
radial line development
radii
radius
radius of gyration
rafter
rail
railing
ramp
ratchet
ratio
ream
reamer
reciprocal
rectangle
rectangular
reducer
reducing
reference
refrigerator
regular
reinforced
rendering
representation
retarded
return miter
revolution
revolve
rheostat
rhombus
rib
ribbed
ridge
ridge board
right angle
ring
rise
riser
rivet
riveted joint
riveting
rocker arm
rod
roller
roller bearing
roller curtain
Roman letter
roof
roof collar
roofing
roof pitch
roof plan
roof truss
root diameter
rope
rotary
rotated
rotation
round
round head
rounds
rowlock
ruling
running bond
safe load
sash
sash pulley
sash weight
scale
scales
scientific
scoop
scraping
screw
cap
collar
conveyor
differential
lag
machine
propeller
set
wood
screw eye
seam
secant
section
full
half
revolved
section modulus
semicircle
separator
setscrew
shaft
shafting
shape description
shear
sheathing
sheave
shed
sheet metal
sheet-metal drafting
sheet washer
shingle
shiplap
siding
silicates
sill
sine
site
size description
sketch
skewback
slant
sleeve
slide rule
sliding head
slope
socket
soffit
soil
soldier course
sole
solution
southern
spacer
spacing
span
specification
specific gravity
speed ratio
speed regulator
sphere
spiral
splay
splice
spot face
spring
square
square root
square thread
stack
staircase
stairs
stairway
stanchion
standard
station point
statistics
step
step bearing
stiffener
stile
stone
stool
stop
storage
strength
stretchout
stretcher course
stringer
structural
structural iron
structural steel
structure
stucco
stud
stud bolt
studding
stuffing box
subfloor
surface
symbol
symmetrical
symmetry
tailstock
tangent
tangential
tank
tap
tape
taper
Brown & Sharpe
Jarno
Morse
taper pin
tapped
T bar
technique
temper
template
terra cotta
theory
thickness
thickness of tooth
third-angle projection
thread
national coarse
national fine
national standard
pipe
S.A.E.
U. S. Standard
threaded
threshold
thrust
tie rod
ties
tile
tilting table
timber
timing lever
title
title block
tolerance
tool post
tooth
tooth parts
topographic
torsion
tracing
tracing cloth
tracing paper
transfer
transition piece
transparent
transpose
trapezoid
tray
tread
trial
triangulation
trigonometry
trisect
trowel
true length
truncated
trunnion
T square
turnbuckle
type
undercut
uniform
uniform motion
unit stress
universal joint
upset
valve
gate
globe
seat
stem
variable
V block
velocity ratio
vertical
vestibule
view
vise
visible
voids
volume
volumetric
V thread
wainscoting
wall tie
washer
washing machine
water table
waterproofing
weather strip
web
wedge
weight pocket
welding
Whitworth
whole depth
width
wing
wiper
withe
wood
Woodruff key
working
wrench
wrist pin
writing fluid
wrought iron
Z bar

THE NEED FOR VOCATIONAL EDUCATION

We must increase vocational education for those children who otherwise would not receive adequate training. My own observation leads me to believe that in many parts of the country we have tended to an educational system devised too greatly for academic training and professional careers. We know that already many of the professions are oversupplied and it is a fair guess that during the coming generation we shall devote more attention to educating our boys and girls for vocational pursuits which are just as honorable, just as respectable, and in many instances just as remunerative as are the professions themselves. — *Franklin D. Roosevelt.*

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

J. J. Metz, Editor

Production Work or Not

"No, sir, there'll be no production work in my shop" — so said one shop teacher to another. Then he continued: "I have an outline of my course of study and follow that, and I permit no one to interfere with it."

At first sight, there seems to be much weight to what that teacher said. There is need to be careful lest production take on greater significance than the need for instruction. Probably it is well to define what is understood under the term "production work" in the school shop. Usually, instructors include in it, all work that is done for other than student or teaching purposes. Thus they include the work done for the individual school, for the school system, or for charitable or civic bodies.

There is danger, of course, that the willing teacher may be burdened with so much of this special work that his outline of instruction becomes a mere exhibition piece. Between the two extremes — the teacher who will have absolutely no production, and the instructor who depends entirely on production work for his instructional material — there is a fairly wide chance for selection, and here, as in other life situations, the wise man selects neither extreme but a golden mean.

At the outset, it is well to analyze the so-called production work in order to ascertain its possible advantages and disadvantages. For the teacher, of course, the student must be the first concern. How will production work affect the pupil? How will it fit into the work given in the school shop? The earnest teacher will naturally want to apply these criteria before deciding for or against the inclusion of this type of work in his course outline.

There seem to be very good reasons for including some production work in the school-shop course. Production work is the common method followed by industry. Since, then, it will form a major portion of the shop experiences of many of the students just as soon as they enter industry, it is reasonable to assume that it is something for which some provision ought to be made in the experiences to which the pupil should be subjected in school. This must be carefully taken into consideration when planning the shopwork which the student is to take while at school.

It is well to remember that excluding all production work would rob the student of a valuable contribution which the school shop can make. Of course, production work in the school shop can be overdone. The beginner in woodwork cannot be utilized immediately at making highly finished tables, benches, or cabinets. The first-semester student in general metal cannot be expected to make fancy grilles or other ornamental iron pieces for use in the school office or school auditorium. The learner in the machine shop who has barely mastered the elementary principles of the lathe, is hardly in a position to do the precision work required in the repair of instruments used in the physics laboratory. The boy who has just started auto mechanics should not be depended on for overhauling a high-priced car. The beginner in electricity is not far enough advanced to be intrusted with the installation of a school broadcasting system. The boy who has just entered the printshop ought not to be asked to set or feed the school weekly. Principals and supervisors ought to take such obvious things into consideration when demanding extra work from the school shop. Most of them do, too.

The wide-awake teacher, however, knows that there comes a time in the year when his pupils are advanced far enough to do this type of production work fairly well. He also knows that they derive a great deal of benefit from it. It is up to him, then, to see how best he can fit it into his course. It is up to him also to acquaint the proper people when and under what conditions he can take in work of this kind. He will find that students are usually very anxious to do this work, and that they take considerable pride in doing it well. Some teachers who have been handicapped by extremely short shop periods, have been quite successful in starting clubs for taking care of this extra work, and their students have been so interested that they were quite willing to spend considerable time after school and on Saturday mornings to gain the valuable experiences which production work of this kind can give.

Handicraft and Hobby Clubs

The past few years have seen an unprecedented increase in the number of home shops. During this same period, the development and improvement of the small power woodworking and metal-working machines has been advancing by leaps and bounds. With enforced idleness and decreased income, many forms of commercialized pastime habits, developed during a period of prosperity, had to be abandoned. Adults found that only a certain portion of the time could be spent in the fruitless search for a new job and that in order to preserve one's mental equanimity, some other activity had to be chosen. Under these conditions, many reverted to their youthful ambition to "make something." The more fortunate ones who still had some money and who could look at the future without fearing actual starvation, equipped their shops with small power tools and other needed equipment, while the great majority did the best they could with saw, hammer, plane, chisel, and pocketknife. Some living in the larger cities were ambitious enough to take advantage of the opportunities offered by wide-awake school systems, and so many of those who returned to school chose shop

courses that it almost seemed as if the three R's were the much talked of frills and fads.

Some of the work chosen at school was for the purpose of vocational training, but much of it was taken up with the idea of developing handicraft skills for hobby purposes. Much of the work accomplished by these students was amazing and anyone who has attended any of the hobby and handicraft exhibits held in the many cities throughout this land, must admit that at least some of the unemployed spent their time to good advantage.

At the Michigan Industrial Education Society convention held recently at Battle Creek, Mr. H. M. Dexter, an instructor of metal work of Grand Rapids, exhibited some of the work produced in his hobby classes by men and women who spent many happy hours which would otherwise have been lost in idle worrying about conditions which they could not alter. The work which many of them accomplished is nothing short of marvelous. Other teachers also can start clubs of this sort. By so doing they not only achieve a great deal of self-satisfaction but do an immeasurable amount of good. Mr. Dexter's fine exhibit pleased those who attended the Michigan convention, but beautiful as the work was, it did not show how much despair it had averted and how much mental anguish it had appeased.

Making Use of the Interest Factor

There are many instructors who are quite adverse to the idea of permitting their students to have any choice in the selection of the projects to be made in the school shop. These teachers say that they have developed a course which they know will serve to teach their subject to the student, and that they can allow nothing to interfere with the orderly procedure which they have planned.

There may be some value to this attitude, but the teachers who hold it, fail to take into account the tremendous force and value of making interest a vehicle for transmitting knowledge. The boy who is working on a project which he has chosen or helped to choose because of some fancied or real individual liking or need, will overcome difficulties that may arise, and acquire needed supplementary knowledge and skills, very much easier than the student who does not have the incentive of this extra interest in the job with which he is confronted.

Salesmen always strive to reduce the sales resistance to their product as much as lies in their power. To accomplish this removal of opposition to the consummation of a sale, salesmen are willing to expend considerable time and thought and effort. They are interested in the results obtained mainly because of the greater ease with which they can turn a sale. The instructor is confronted with a similar problem. He, of course, is not interested in making a sale of a product, but he is greatly concerned with making the transmission and acquisition of knowledge or skill as effortless as possible.

In order, then, to make a shop course so flexible that each student can practically choose at will and in that way tie up an extra amount of interest in each job that goes through the shop, may require a great deal of extra thought and planning on the part of the instructor. It will require him to make a careful scrutiny of the many projects appearing in books and magazines. It will mean a careful tabulating and card indexing of them so that they can be found without loss of time. It will mean the careful analysis of each one of these projects so that they can be classified into groups presenting the same types of difficulties for the beginner. It will mean the preparation of type production sheets showing the student how to plan his own method of procedure. It will mean the organization of student management in the school shop. All of this will entail labor and lots of it. After the scheme is once well started, however, the teacher will be delighted with the ease with which it functions and the results which he will obtain because of taking advantage of the interest factor in his shopwork.

Vacation Time

It is not too early to start instilling into the student a few safety precepts which may do much in saving lives during vacation time. For the younger students, the kite-flying season has already opened. In the early days there was practically no danger connected with this most interesting sport, but today where congested traffic and high-power electric wires are a menace confined not merely to the city, but one which extends even to the open country, a word of caution to the youngsters is not out of place.

Practically every year several deaths are attributable to kite flying in the neighborhood of high-tension lines. Not only is there danger of short-circuiting across the wires when the kite or the string with which it is held contains moisture or metallic parts, but the danger is always present that youngsters in their anxiety to free a kite entangled in the transmission wires, may climb upon poles and short-circuit the lines with their bodies.

The boys who are now preparing kites, airplanes, and other similar toys, also should get definite safety lessons, calling their attention to the danger of darting out upon highways in following the erratic flights of kites and airplanes, or in operating scooters, express wagons, or other toys of this kind.

The boy who is building a model boat should be cautioned to be careful near the water. Many a youngster, in trying to free his boat, has been drowned. Nonswimmers should be especially careful. A little time spent by the teacher on the preparation of these related safety lessons, may save the lives of some of the promising youngsters who may otherwise be reported missing when the school opens next fall.

Home-Mechanics Research Results

Louis V. Newkirk

Chicago Normal College,
Chicago, Illinois

An interesting study determining when certain home-mechanics jobs are performed and by whom.

THE following study, submitted as an M.A. thesis by Leo C. Schultz at the University of Iowa in 1930 under the direction of Prof. George D. Stoddard, contains data which will be of special interest to home-mechanics teachers. It adds a new note to the administration of surveys to determine the outstanding projects for a home-mechanics course in that the time of year and the particular member of the family who did each project were recorded over a period of twelve months.

The study is divided into the following units: Plumbing, heating, finishing, building and repair, electrical repair, household repair, cleaning, touring, automobile, and yard work. Each division is broken up into specific jobs which results in 177 suitable for instruction. The 177 jobs were printed on a chart which could be hung in the kitchen of the homes under observation. Space was provided on the chart for indicating which jobs were done each month and who performed them. The 356 homes coöperating in the study are located about equally in Cairo, Illinois, and Cape Girardeau, Missouri.

The following table is taken from the compiled results of the survey, with the jobs ranked from highest to lowest frequency. In using the results of the study it is well to bear in mind that they are not put forward either by the author or the reviewer as final, but simply as a record of the jobs that were done for one year in 356 homes located in two small cities in the middle west.

Results of Home-Mechanics Survey

Name of Job	*Ranking*	*Ranking by Persons*[1] *1st*	*2nd*	*3rd*	*4th*	*5th*	*Season*
Polish shoes	6	W	B	G	H	O	Year
Press clothes	7	W	G	O	H	B	Year
Wash windows	10	W	H	B	G	O	Year
Clean mirrors	11	W	H	B	G	O	Spring, Fall
Mend clothes	12	W	G	H	B	O	Year
Polish woodwork	14.5	W	G	B	H	O	Spring, Fall
Clean rugs	14.5	W	B	G	H	O	Spring, Fall
Build fire in stove	16	H	W	B	G	O	Year
Sew buttons on clothes	17	W	G	H	B	O	Year
Hang a picture	18.5	W	H	B	G	O	Year
Drain, clean and refill car with new oil	18.5	O	H	B			Year
Hang curtains	20	W	G	H	B	O	Spring, Fall
Clean light fixtures	21	W	G	B	H	O	Spring, Fall
Clean silverware	22	W	G	B	H	O	Year
Clean carpets	23	H	B	W	G	O	Spring, Fall
Clean woodwork	24	W	G	H	B	O	Spring, Fall
Fire furnace	26	H	W	B	G	O	Winter
Sharpen a kitchen knife	27	W	H	G	B	O	Year
Cut grass	28	H	W	G	B	O	Summer
Grease car	29	O	H	B	W	G	Year
Oil sewing machine	31	H	B	W	G	O	Year
Test and fill battery	32	O	H	B	W	G	Year
Build fire in fireplace	33	H	W	B	G	O	Fall, Winter, Spring
Test or replace light bulb	34	O	H	B			Year
Clean furnace	35	H	O	B	W		Fall
Gas range, clean and polish	38	W	H	B	G	O	Spring, Fall
Wash and polish car	39	O	H	B	W	G	Year
Drive car	40	H	W	B	G	O	Year
Make a piece of furniture	41.5	B	H	O	W	G	Year
Drain and flush radiator	43.5	H	B	W	O	G	Spring, Fall
Repair inner tubes	43.5	O	B	H	W	G	Year
Wax floor	45.5	W	H	O	B	G	Spring, Fall
Change tire and inflate	45.5	O	B	H	W	G	Year
Take care of garden	47	W	H	B	G	O	Spring, Summer
Hang a door	48	H	B	O	W	G	Year
Repair light socket	49	H	B	O	W	G	Year
Knowledge of traffic rules	50	H	B	G	W		Year
Sharpen scissors	51.5	H	O	B			Year
Take care of flowers	51.5	W	G	H	B	O	Spring, Summer
Clean wall paper	53	W	H	O	B	G	Spring
Paint old furniture	54	W	H	B	G	O	Spring
Plant or trim hedge	55	H	B	O	W	G	Spring
Drain trap, clean	56	H	O	B	W	G	Year
Repair window shade	57	H	W	B	O	G	Spring, Fall
Clean flue	58.5	H	B	W	O	G	Fall
Set up stove	58.5	H	W	B	O	G	Fall
Faucet repair	60	O	H	B	W	G	Year
True up a door that sags or binds	61	H	B	W	O	G	Spring
Adjust carburetor	62	O	H	B			Year
Repair piece of furniture	64	H	O	B	W	G	Year
Adjust brakes	65	O	H	B			Year
Repair or tighten sewing machine	66	H	B	W	O	G	Year
Frame a picture	67	O	H	B	W		Year
Repair vacuum cleaner	69	H	W	B	O	G	Year
Clean and adjust spark plugs	69	O	H	B			Year
Make bird house	69	B	H	O			Spring
Grind valves	71	O	H	B			Year

[1]The letters in this column refer to the following: W, wife; G, girl; B, boy; H, husband; O, outsider.

Name of Job	Ranking	Ranking by Persons					Season
Repair flush tank	72.5	O	H	W	B		Year
Remove varnish..	72.5	W	H	B	O	G	Spring
Varnish floor.....	74.5	H	W	B	O	G	Spring
Repair electric iron	74.5	H	O	W	B	G	Year
Oil springs on car	76	O	H	B			Year
Replace fuse in switch box	79	H	B	O	W	G	Year
Paint floor	80	H	W	B	O	G	Spring
Repair extension cord	81	H	B	W	O	G	Year
Repair stepladder	82	H	B	W	O	G	Spring
Repair table drawer	83	H	W	B	G	O	Year
Put up aërial for radio	84	O	H	B			Year
Test radio batteries	85	O	H	W	B	G	Year
Replace lock	86	H	O	B	W	G	Year
Spray garden or trees	87	W	H	B	G	O	Spring, Summer
Replace light socket	88	H	O	B	W	G	Year
Apply top dressing	89	H	B	W	G	O	Year
Test radio tubes.	91	O	H	B			Year
Repair leaks in water pipes....	92	O	H	B			Year
Replace window glass	93	H	B	O			Year
Repair window screens	94	H	B	O	W		Spring, Summer
Clean commutator	95	O	H	B			Year
Thaw out frozen water pipes....	96	H	B	O	W		Winter
Focus headlights..	97	H	B	O			Year
Clean carburetor.	98	O	H	B			Year
Paint new wood..	99	H	W	B	O		Year
Hang wall paper..	100	O	H	W	B	G	Spring, Summer
Put on weather stripping	101	O	H	W	B	G	Fall, Winter
Read electric meter	102	O	W	H	B		Year
Strengthen joints on furniture...	102	H	B	W	G		Year
Repair steps.....	106	H	O	B	W	G	Year
Adjust gas range.	107	O	H	W	B		Year
Stain new wood..	108	H	W	O	B	G	Year
Make window screens	109	H	B	O			Spring, Summer
Use and test fire extinguisher ...	110	O	H	B	W	G	Year
Clean gasoline stove	112	W	H	B	G	O	Year
Build fire in woods	113	H	B	G	W	O	Year
Whitewash trees, fence, etc.....	114	B	H	O	W	G	Spring, Summer
Repair porch floor	115	O	H	W			Spring, Summer
Make temporary casing repair...	116	H	B	O	W		Year
Replace head- or tail-light bulbs.	117	O	H	B			Year
Repair fence.....	118	H	B	W	O		Spring, Summer
Drain and clean out stool	119	H	O	B	W	G	Spring, Summer, Fall
Repair leaks in roof	120	O	H				Spring, Summer
Put new batteries in radio.....	121	O	H	B			Fall, Winter
Repair electric washing machine	122	H	O	W	B		Year
Trim trees.....	124	H	O	B	W	G	Spring
Whitewash walls.	125	B	H	O	W		Spring, Summer
Repair a garden hose	127	B	H	W	O	G	Spring, Summer
Read gas meter..	128	O	W	H	B		Year
Paint porch floor.	129	H	W	B	O	G	Spring, Summer
Sharpen lawn mower	130	H	O	B			Spring, Summer
Radiator, adjust valve	132	H	W	O	B	G	Winter
Kerosene stove, clean burners ..	133	H	W	O	B	G	Year
Repair cracks in plastered wall..	134	H	W	O	B	G	Spring, Fall
Make plant trellis	135	H	B	W	O	G	Spring, Summer
Paint house	136	O	H	B			Spring, Fall
Varnish old furniture	137	W	H	B	G	O	Year
Repair and paint gutters	138	O	H	B			Spring
Repair leak in radiator	139	O	H	B			Winter, Spring
Make an extension cord	140	H	O	B	W		Year
Put in floor or wall socket	141	O	H	B			Year
Reseat chairs....	142	H	W	B	O	G	Year
Clean gas lines...	143	O	H	B			Year
Repair light switch	144	H	O	B			Year
Clean squeaky brakes	145	O	H	B			Year
Make window ice box	146	H	B	O			Fall
Repair wooden walk	147	H	B	O	W	G	Spring, Summer
Replace burners in kerosene stove .	148	H	W	B	O		Year
Varnish new wood	149	O	H	W	B	G	Year
Repair doorbells .	150	H	B	O			Year
Build dog kennel.	151	B	H	O	W	G	Year
Clean cistern	152	O	H	B			Fall
Paint rust places.	153	H	B	O	W	G	Spring, Summer
Make porch flower box	154	H	B	O	W	G	Spring, Summer
Tighten shackles .	155	O	H	B			Year
Build chicken house	156	H	B	O	W		Spring
Screen-in porch..	157	O	H	B	W	G	Spring, Summer
Repair pump cistern	158	H	W	B	O	G	Year
Repair scratched table top.....	159	O	H	W	B		Year
Repair window lock	160	H	W	B	O	G	Fall, Winter
Solder a kitchen utensil	161	H	B	O	W		Year
Sod a piece of ground	162	H	W	B	O	G	Spring, Summer
Repair windshield wiper	163	H	O	B	W		Year
Clean and polish electric range..	164.5	W	O	H	B	G	Year
Shingle roof.....	164.5	O	H	W			Spring, Summer Fall
Put on new hose	166	O	H	B			Year
Replace window cord	167	O	H	B			Year
Build garage.....	168.5	O	H	B			Spring, Summer Fall
Repair short circuit	168.5	O	H	B			Year
Repair chimney..	170.5	O	H	B			Year

Name of Job	*Ranking*	*Ranking by Persons*	*Season*
Repair leak in gas pipe	172	O H B	Year
Build concrete walk	173	H B O	Spring, Summer
Read water meter	174	O H W	Year
Kalsomining	175.5	H W B	Spring, Summer, Fall
Repair concrete walk	175.5	H B O	Spring, Summer
Make concrete ornaments	177	O H B	Spring, Summer

Sheet Metal in the School

J. W. Bollinger

Tulsa, Oklahoma

A graphic delineation of what sheet metal contributes to general education.

THE "new deal," with its new social order, will bring with it a "new education." For one thing, in the new scheme of things, the academic type of studies will necessarily give way to a greatly increased emphasis on the social studies. This, in turn, will bring about a greatly increased emphasis on the mechanical studies, and a greater demand for the products developed through our mechanical intelligence. For when, in the new order, human beings are provided with greater incomes through a more equitable distribution of the nation's wealth, they will raise their standard of living, and demand many more of the mechanical aids that now are considered luxuries. Through a shortening of the working day, people also will possess a far greater amount of leisure time than ever before, and will turn, among other things, to mechanical pursuits in their search for leisure-time occupations.

One of the studies that will come in for its share of expansion in the new school is the field of sheet metal. The accompanying chart shows the six leading divisions of the industry: automobile-body manufacture; production of household utensils and furniture; manufacture of toys, tin cans for the preservation of foods, and other necessities; application in the construction of houses and buildings; uses in heating and ventilating; execution of artistic wares out of brass, copper, and silver. A study of these industries with the help of proper textbooks, specially produced moving pictures, and planned field trips to local industries; a study of the products of these industries at first hand; and the construction in each field of such articles as may be made with the equipment on hand in the shop, naturally lead into the values represented in the outer series of circles. These, in turn, contribute to the development in the pupils of the generally accepted major objectives of education, as shown in the inclosing ring.

Patternmaking and Its Scope

Frank C. Cech

Cleveland Trade School,
Cleveland, Ohio

Patternmaking and its contribution to general education graphically shown.

THIS graphic depiction shows how the cellular ring growth that forms the tree "General Education" may encompass a vocational subject as the core.

Lean years have brought retrenchment. Retrenchment has brought attack on school subjects. Surveys have followed the attack. They have revealed that vocational education has contributed, or may be made to contribute, more to general education in a painless, interesting and coöperative way than has heretofore been realized. It is *not* always the most expensive method of teaching.

What has patternmaking to offer general education? Consult the chart. The core is made up of patternmaking in its entirety.

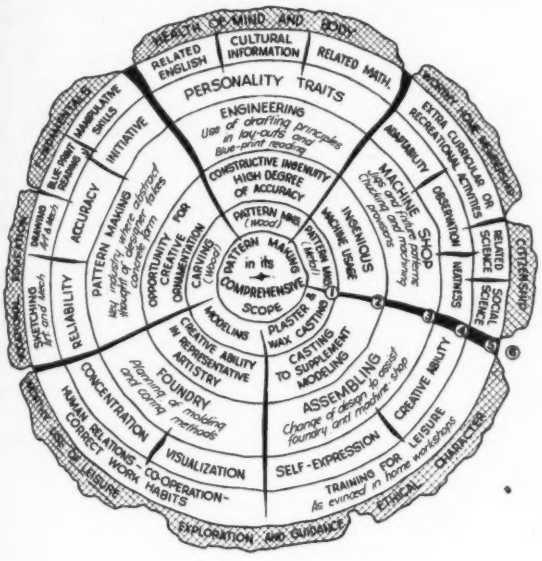
The first annual ring is composed of cells feeding each other. While wood patternmaking is the most common, it shares honors in this respect closely with the metal branch. They are assisted by three other vocations that are seldom associated with patternmaking.

Annual-ring growth No. 2 presents avenues for self-expression of individual differences. Of these, only metal patternmaking presents something new and modern. The others are as old and can be traced almost as far back as humanity itself. The materials and skills represented have been the means of recording life, customs, and culture of generations gone by. They promise as much for the future.

The third ring growth includes the modern, closely related mechanical cycle involved in the production of that highly praised, much maligned and condemned object — *the machine*.

Patternmaking requires the use of certain drafting-room principles. It is the key industry where the abstruse thought of the draftsman and inventor takes concrete form. It is a

THE RUGGED BARK PROTECTS THE TREE - THE CARDINAL EDUCATIONAL AIMS, WHEN ATTAINED, - THE INDIVIDUAL - AND THROUGH HIM - SOCIETY AT LARGE.



go-between that offers little promise of elimination as long as the casting of metals and kindred substances persists. The foundry principles of producing the casting, and the later methods of machining must be considered and planned for in the pattern shop by the coöperation of all three departments. Changes in design affect, or are affected, by the methods of the assembling department which has grown to be such an important cog wheel in the cycle of producing machinery.

The fourth ring contains human elements so necessary in an interdependent civilization.

The fifth is the inclusive extent of a successful pattern-making-division curriculum.

The sixth ring represents the bulwark of civilization. It is composed of the often-heard and much-repeated cardinal aims or objectives of general education.

The objectives of the school shop in its various phases must be considered in establishing a course of patternmaking.

The junior-high-school objective is exploratory; the course of a practical nature; that of the technical high school, exploratory with an understanding and appreciation of the subject. It consists of a practical shop course plus a theoretical course. The all-day unit trade, part-time, coöperative, and trade-extension schools include exploratory, understanding, appreciation, ability, and skill objectives with a leaning on the latter.

The instructors involved in teaching shop subjects in the above-mentioned schools can, by coöperating, unify courses. A close coördination can be obtained by using all the materials involved in general patternmaking in different projects of a graded difficulty, having identical operations. Little has been done with the theoretical portion of patternmaking.

For example, a junior high school may include in its general shop such materials as modeling clay and wax, and plaster paris. (See "Patternmaking in the Junior High School," INDUSTRIAL ARTS AND VOCATIONAL EDUCATION for November, 1932, page 324.)

A technical high school would include wood and metal patternmaking in accordance with the above-stated objectives. The balance of listed schools should follow up with the whole unit of patternmaking. Stress must, of course, be placed on the elected vocational type of patternmaking.

The Modern Auto Shop

A. H. Vance

Harshaw, Wisconsin

Automotive instruction in high school must serve the purpose of general education for the majority in the class, while only a few will use it as a preparation for industry.

WHEN the auto shop was first added to the shops already existing in high schools, teachers were secured from various sources. Some came from industry, others from war training camps, and still others were merely transferred from other subjects into auto-shop work. Equipment was collected with no one seemingly knowing quite what was needed in order to teach the work. There was only one point on which all seemed to agree — a Model T Ford was absolutely necessary. The large numbers of this car in general use were responsible for this unanimous decision. And so a Model T Ford was secured and duly installed in a post of honor.

Then the methods of teaching the subject began to attract attention. If twelve teachers had been asked how to teach auto shop, there would have been twelve different methods immediately available.

But the job-sheet method soon took the field, because it provided something definite to work with. It gave the boy something which told him exactly what he was expected to do. Of course, it was necessary to fit the job sheets to the available equipment, or to fit the equipment to the job sheets, as the case may have been.

The use of the job sheet does not relieve the instructor from the proper classroom work, such as the necessary lectures to fit the subject, and the needs of individual classes for special help in the tight places. But the use of this job sheet has made possible the proper combination of theory and practice, which is necessary in order to make clear the function of the parts of the automobile, and also their relation to each other in the automobile as a whole.

There are many reasons for a boy taking up automotive work. If a boy has a mild curiosity to see what the work is like, or when the work is merely a part of the course the boy has chosen, it is desirable that he be given a secure foundation on which he can build higher if he should wish to do so.

If a boy has chosen the auto shop seriously with a view of entering industry, it is naturally important that he have a suitable foundation.

While the job-sheet method of teaching automotive work seems to lead the field, there is, nevertheless, a great variation in actual teaching methods, and the question of just what should be taught in a high-school auto-shop course comes up again and again. This question is not unanswerable, even though the automobile industry itself cannot be expected to give a satisfactory answer. The reason for this is plain:

the high degree of specialization in the repair shops and the factories simply means that any industrial man who was asked, would immediately think of an answer as applied to his own particular part of the work. The answer would be mixed with prejudice, either in favor of, or against, his own branch of the work. Then, too, the tendency for the machine to dominate the man has become very great within the industry itself.

There are certain fundamentals generally used in the construction of automobiles. These must be considered in the school, for they are definite facts, which remain unchanged over long periods of time. Summing them up briefly, we can say that they are simply common-sense mechanical principles, which are consistently applied to automobile construction. An entire semester can be devoted to teaching these principles.

One of these fixed mechanical principles may be illustrated by a study of the method of attaching a spring to the frame of a car. It will be immediately apparent that the spring must be shackled at one end to allow for the movement of the other end when the spring is flexed. If the shackle is not used then *some* other provision permitting motion must be made, for this end movement is a fixed and unchanging fact.

The fact that cylinders are always cast is another unchanging fact. The actual composition of the metal used may change, but the fact still persists, that castings are and have been exclusively used for making cylinders.

Bearing friction is another established fact. While many different types of bearings are found in the modern automobile, friction will be found in varying degree in all of them. The relation of bearing friction to the power required to drive the car can be established. The additional friction set up by the brakes as a stopping medium may be studied as a fixed law of mechanics.

Comparing automobile construction over a period of more than twenty years, we will find that changes are confined chiefly to refinements of details. These refinements may be taught after the fixed principles have been covered.

The present industrial methods of building, repairing, and distributing automobiles should be discussed. Then the possibilities for the boy's future chances of success in the industry should be openly discussed, with the object of aiding him to decide intelligently as to whether he desires to make a lifework of this industry or not.

One modern auto-shop instructor expressed this phase of the situation very clearly and concisely, when he said, "It is just as important for the boy to know what he does not want to do, as it is for him to know what he does want to do."

It appears, then, that the most satisfactory method of teaching auto-shop work consists in giving the boy a thorough knowledge of the basic facts of automobile construction, and not to overlook the fact that the automobile is primarily a tool, designed for the benefit of the human race. With such a background the boy can leave the school auto shop, and go directly into some branch of the industry with a hope of satisfactory progress in his chosen line of work. Or he can go into some other profession, or work, and feel secure in the knowledge that his course in the auto shop has given him a better understanding of the economic relationship of the automobile to modern life.

The actual attainment of these things is not a simple matter. The course must be well planned, and this planning made apparent to the boy by definite instruction. Then the proper consolidation of the jobs into a harmonious whole must be accomplished in some manner, with the full realization that the vast majority of students are interested in automotive work only as a part of their general education.

Valve grinding, the hand scraping of main bearings, and the lapping-in of pistons are not the methods used in industry for a number of years, yet these operations impress the student in a manner that is much better than any amount of explanation regarding the newer methods.

Engine-testing methods, as used in the industry at the present time, may be illustrated to a class by means of an electric dynamometer. However, the meaning of brake horse power can be easily shown by means of the ordinary prony brake, and suitable formulas, which are not beyond the understanding of the average boy. Fuel consumption can also be easily shown to the class by means of glass tubes filled with fuel. The amount used can be observed and measured. A simple formula will give the actual gasoline consumption per brake-horse-power hour — the basis for power calculations.

The instruction sheets used should embody the statement of the job in as few words as possible, and questions regarding the work done should be given. The newer type of test questions should, however, be used so that the instructor can see at a glance whether the questions have been answered correctly, and so that due credit may be given the boy immediately.

Problems and Projects

SEGMENTAL BOWL

C. E. Camp, Billings Polytechnic Institute, Polytechnic, Montana

This built-up type of bowl has proved very popular. Although it takes more time to make than an ordinary bowl, the smaller quantity of wood required for it, and its general beauty, makes it a general favorite. If the work is done with reasonable care, a bowl of this type is less likely to warp and is even stronger than one made from a solid piece. Black walnut and red gum or maple may be used in its construction.

The order of procedure is as follows:

1. Decide on the size of bowl desired and make a cardboard template for the segments of the ring as indicated at E.

2. Face top and bottom of 2-in. stock of the required width and length, and trace upon it the segments as indicated at D. Place them as suggested in relation to the end grain, and number them in order on top.

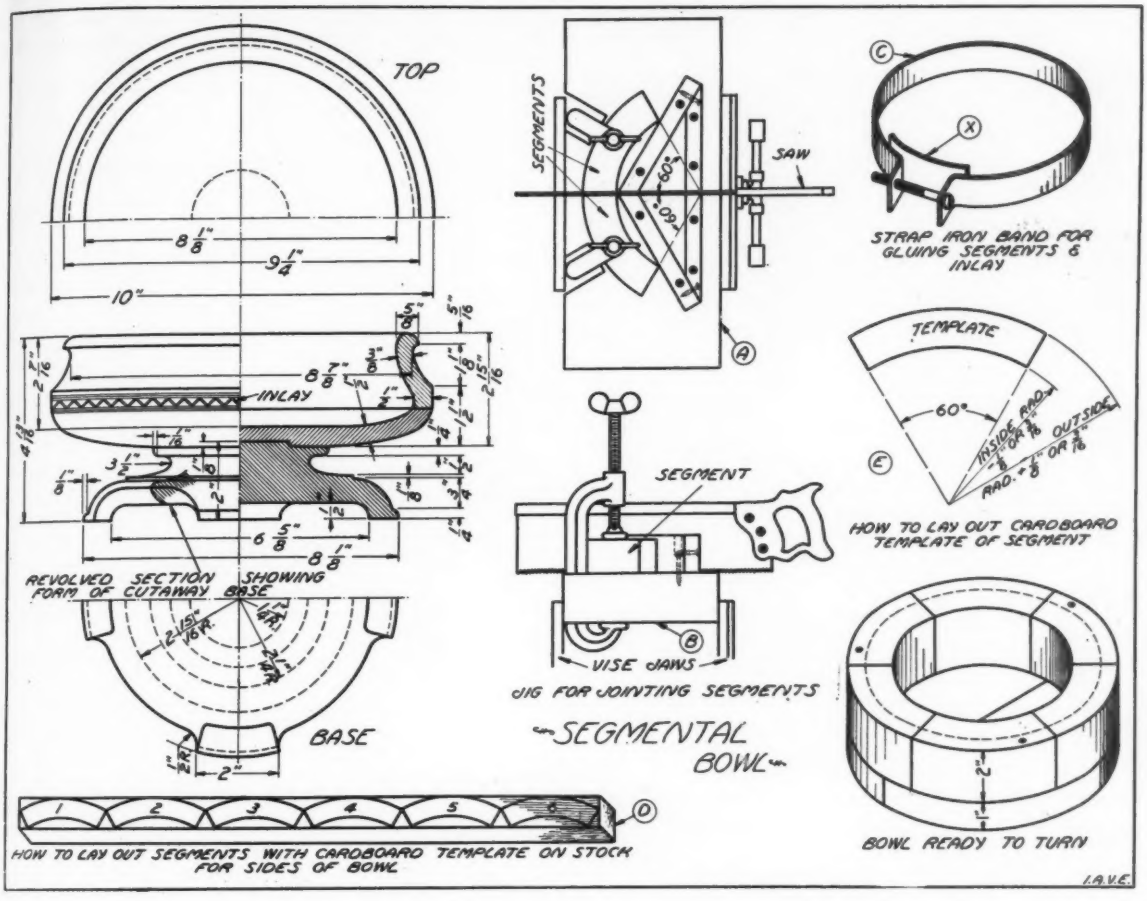
3. Cut out the segments on a band saw or jig saw and then fit them together very carefully in the same order. The success of the whole project depends largely on this jointing operation. It may be facilitated by using the jointing jig shown at A and B.

4. Assemble the segments dry and clamp with a draw-bolt band like that shown at C, to check up on the fit at each joint. The draw-bolt band also is used with the extra piece X in the inlaying operation later.

5. As rapidly as possible glue both pieces at every joint, contacting adjoining segments as soon as the glue is on. When all are in place, and even on top, adjust the band and tighten draw bolt (¼ by 2½-in. r.h. stove bolt) until all fit snugly together. Set aside to dry overnight. This will be the bowl ring.

6. For the bottom of the bowl use 1-in. stock which is half as wide and twice as long as the diameter of the bowl. Joint one edge and one side, cut in half and glue and clamp together edge to edge to form a square. Set aside to dry. If possible get a symmetrical grain pattern for this as this will enhance the beauty of the finished project.

7. When the glue is thoroughly dry, fasten the bowl-ring top side to a wooden chuck with three screws as indicated by the



small holes on the isometric view of the bowl. The dotted line represents the outer edge of the rim and the screws must be set outside of it and about one fourth the length of the segment from the joint to avoid splitting. Do not use screws that are too large. Turn down the bottom side of the ring to a surface true to a straightedge held clear across.

8. Band-saw the bottom square to a disk of the same diameter as the ring; screw to a faceplate, leaving the smooth side out, and turn that side to a surface true to a straightedge. This will be the top or inside of the bottom of the bowl.

9. Glue bottom of ring and top of bottom together and clamp tightly so that the joint in the bottom comes in the middle of a segment on each side. Set aside to dry in the clamps.

10. If the base is so high as to require two glued layers of stock, the gluing should have been done already and the base should now be band-sawed to the required diameter.

If the bowl is to have no base, disregard step 10 and proceed with step 11.

11. Screw faceplate to bottom of bowl, centering it very carefully, turn the inside and then the outside as far around toward the faceplate as seems safe. Cut groove for inlay, glue and clamp in place and set the bowl aside to dry. When dry, sand smooth and finish with fine excelsior.

12. Set top of bowl in wooden chuck and turn bottom, making mortise to receive tenon of base. Sand smooth and finish with fine excelsior.

13. Screw top of base to faceplate, turn sides and bottom into desired full round form, cutting required recess into bottom.

14. Set bottom of base into wooden chuck, turn top to dimensions and tenon to fit mortise in bottom of bowl. Sand smooth and finish with fine excelsior.

15. If cutaway base is desired, make layout as indicated in detail view of base. Cut away with jig saw, rasp and file to shape as indicated in revolved section of base of front view and sand smooth.

16. Glue and clamp bowl and base together using blocks to secure pressure only in the middle of each part. Set aside overnight.

17. When glue is dry, clean whole project with old fine sandpaper and fine excelsior. Then proceed with whatever finish is desired, shellac, varnish, French polish or lacquer.

STAGE SETTINGS

George J. Nickel, East High School, Madison, Wisconsin

The sketches and illustrations of scenery construction shown herewith may be of value to instructors. All flats and frames should be made of ¾ by 2-in. grade D white pine. Corner gussets should be ¼-in. plywood fastened on with 1½-in. clout nails.

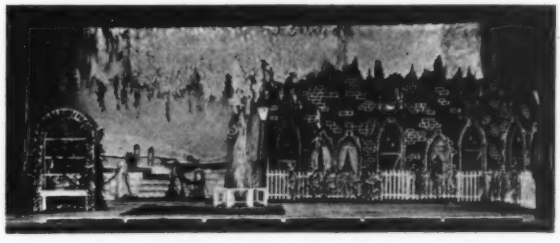
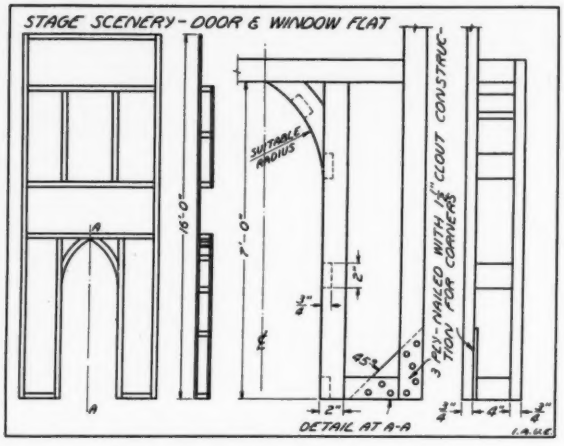


Fig. 1. Scenery for "Pomander Walk" consisting of two-story exterior with practical windows and doors. Also fences, gates, street lamp, and tree with circular seat

To cover the flats, a medium grade of unbleached muslin should be used. This should be tacked to the edges of the frame and then glue-sized all over. The cloth must not be stretched too tight, for otherwise the frames will warp badly.

The settings shown in Figures 1 and 2 were made by the students of the manual-arts department, and the painting was done by the dramatic-arts classes.

Fig. 2. Scenery for "If I Were King"



Detail of door and window flat

SMALL FISHING-TACKLE BOX

H. W. Kroll, Independent School District No. 35, Buhl, Minnesota

Material

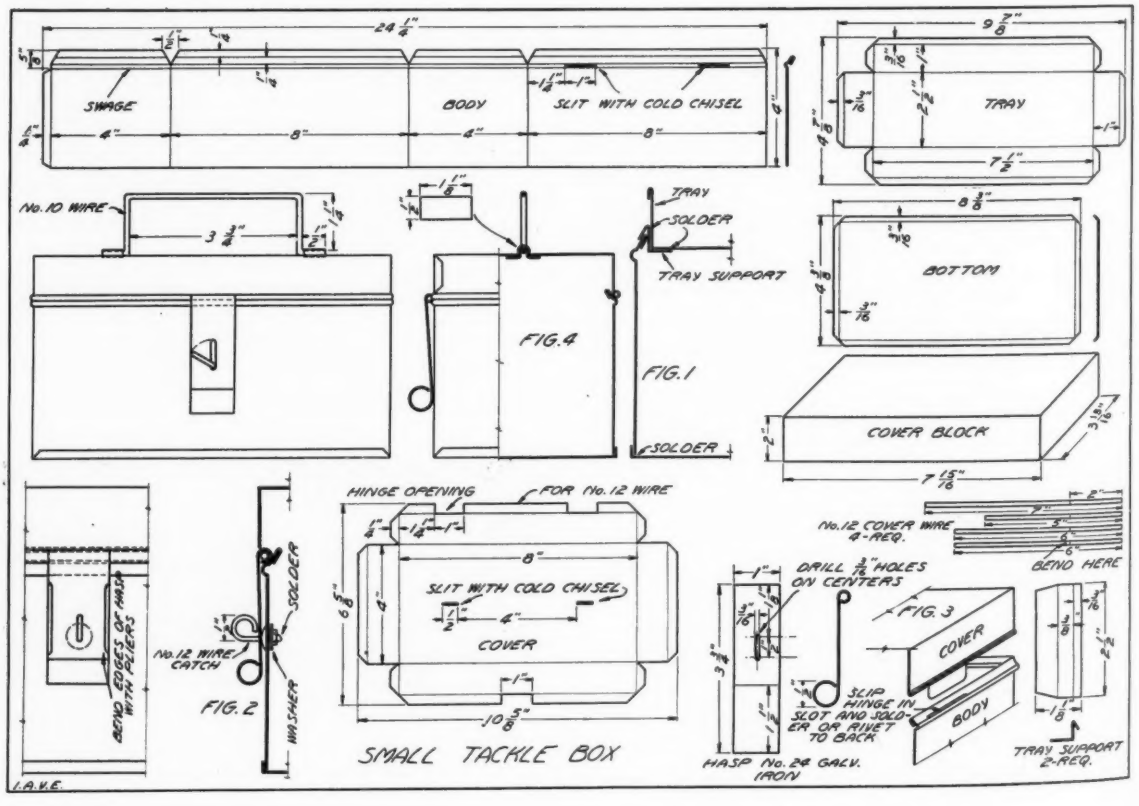
IC or IX tinplate, or No. 28 galvanized iron; No. 12 and No. 10 wire; No. 24 galvanized iron for hasp.

Body

1. Mark out the outline of the body with a scratch awl and indicate where the slits are made for the hinges.
2. Cut the openings for the hinges with a cold chisel. The metal is merely slit along the lines indicated.
3. Fold over a ¼-in. single hem on the top edge as shown.
4. Form the bead or swage just below the ¼-in. fold as shown in Figure 1.
5. Fold the body to the correct shape and solder the ¼-in. lap and the corners above the bead. Shape the corners above the bead on a stake in order to secure a good joint.

Cover

1. Cut out the cover including the slits for the handles. Fold the edges in the right direction for No. 12 wire.
2. Bend down the edges of the cover, over the folding block, and turn laps in place for soldering.
3. Bend the four pieces of wire, 2 in. from one end, to a right angle in the vise. Slip the large 7-in. piece to cover the hasp opening on the front of cover. Slip the others in place accordingly.
4. Complete the work on the wiring machine. Solder the laps in place and after trying the cover on body for an accurate fit, solder the wires at each corner.
5. Make the hinge pieces 1 in. long and bend them around



the wire in the cover, as shown in Figure 3. Slip the hinge pieces into the slits cut in the body. Solder or rivet them in place. Be certain that the cover works smoothly before fastening it permanently.

6. Drill two 3/16-in. holes in the hasp piece as indicated and cut out the remaining material with a cold chisel. Form to the shape shown on the drawing.

7. Slip the hasp around the wire on the cover and adjust to fit accurately.

Catch

1. Hold the cover in place and mark for the hole on body for catch. Drill a ⅛-in. hole in the body.

2. Punch out two ¾-in. disks with a hollow punch. Drill a ⅛-in. hole in the center of each. Form one disk into a convex shape with the ball-peen hammer.

3. Select a No. 12 wire longer than what is required for the hasp and thread one end for a ⅛-in. nut. Cut to the required length in order to form a ½-in. circle, as shown in Figure 2. Heat this end, and form to proper shape.

4. Slip the convex disk on wire and turn on a nut. Solder this nut to convex disk and slip the thread end into the ⅛-in. hole in the body. Slip the remaining disk in place and turn on nut to hold hasp securely. Solder the nut and disk to wire tightly. By turning the catch vertically, the hasp should slip out easily.

Handle

1. Make the handle from No. 10 wire. Be certain you are bending the wire in the vise correctly, so it will have the proper dimensions when completed.

2. Bend the handle clasps around the wire and slip through slots, bending them over on the underside of the cover as shown in Figure 4. Solder in place.

3. Be careful when soldering handle clasps not to sweat solder into joint. Handles should move easily.

Bottom

1. Fold the edges of the bottom up at right angles and slip onto body.

2. Bend these laps against the sides of body tightly and solder all edges on the inside of body.

Tray

1. Fold a 3/16-in. single hem on all edges of the tray.

2. Bend the sides up at right angles with the hems on the outside. Solder the corner laps.

3. Fold the two tray supports as shown. Solder one support at each end of the tray as shown in Figure 1. Bend the tray supports to fit the upper edge of the box.

4. If partitions are desired, cut the necessary pieces, fold and solder in place. Remove any sharp corners with a file and clean the entire project.

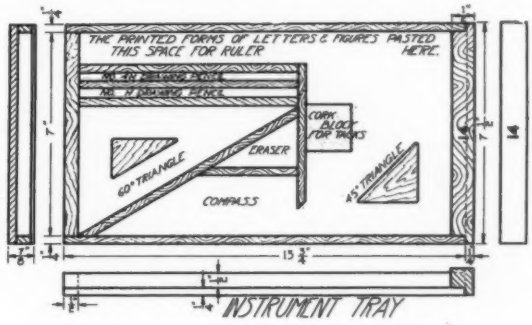
Finish

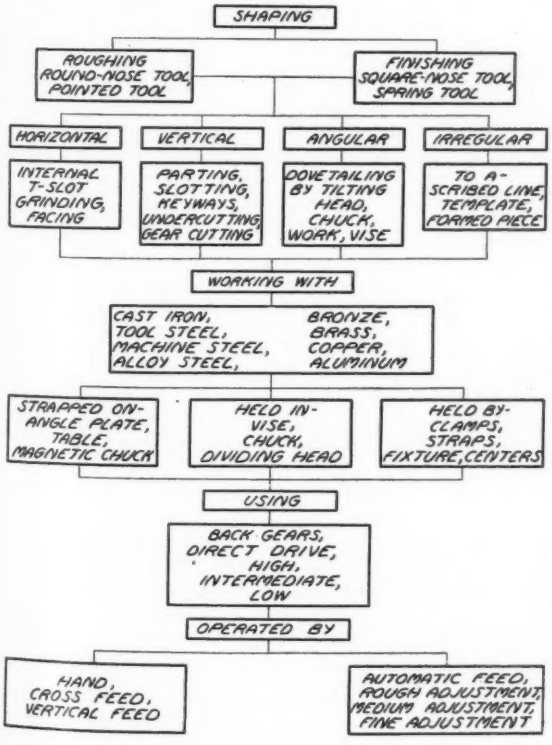
1. Paint the box and tray a suitable color of green, and hang away to dry.

DRAWING-INSTRUMENT CABINET AND TRAY

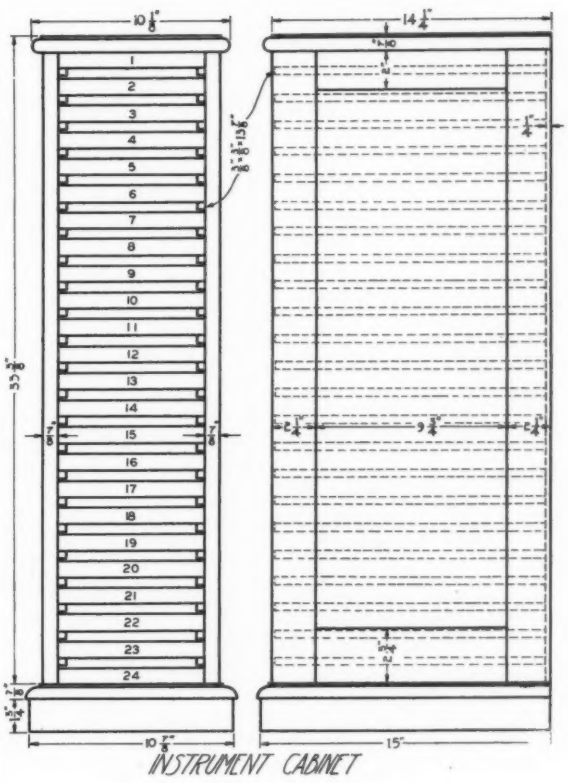
John Capel, Owen Sound, Ontario, Canada

The cabinet and trays for drawing instruments described in this article are time- and labor-saving devices which worked satisfactorily in our industrial-arts department for the past three years.




SHAPING
ROUGHING ROUND-NOSE TOOL, POINTED TOOL
FINISHING SQUARE-NOSE TOOL, SPRING TOOL
HORIZONTAL
VERTICAL
ANGULAR
IRREGULAR
INTERNAL T-SLOT GRINDING, FACING
PARTING, SLOTTING, KEYWAYS, UNDERCUTTING, GEAR CUTTING
DOVETAILING BY TILTING HEAD, CHUCK, WORK, VISE
TO A SCRIBED LINE, TEMPLATE, FORMED PIECE
WORKING WITH
CAST IRON, TOOL STEEL, MACHINE STEEL, ALLOY STEEL,
BRONZE, BRASS, COPPER, ALUMINUM
STRAPPED ON ANGLE PLATE, TABLE, MAGNETIC CHUCK
HELD IN VISE, CHUCK, DIVIDING HEAD
HELD BY CLAMPS, STRAPS, FIXTURE, CENTERS
USING
BACK GEARS, DIRECT DRIVE, HIGH, INTERMEDIATE, LOW
OPERATED BY
HAND, CROSS FEED, VERTICAL FEED
AUTOMATIC FEED, ROUGH ADJUSTMENT, MEDIUM ADJUSTMENT, FINE ADJUSTMENT

Analysis of shaper jobs, by Mark L. Gluckman, New York



Before we had these trays and the cabinet, the triangles, erasers, drawing pencils, thumb tacks, compasses, rulers, etc., were kept in separate boxes. It required six monitors to distribute them, and it took from five to eight minutes to make the distribution, and about the same time to collect them again.

At the command "Line up," the 24 students line up in numerical rotation in front of the tray cabinet. This takes less than one minute. At the further command, "Take out the sets," each student takes his tray and goes back to his bench. This also takes less than 1 minute, and it requires about 1½ minutes to replace the trays in the cabinet.

Each instrument has a number corresponding to the number of the tray to which it belongs. When the sets are being returned to the cabinet, the teacher stands in a convenient place and checks each set as it is replaced. In this way it is quite easy to detect a missing instrument.

AN ELECTRIC PENCIL

Byron M. Taylor, San Diego, California

The simple and easily constructed device described herewith is an excellent school project, not only for itself, but because of the related information that can be taught with it. It gives the student an understanding of certain fundamentals of electric circuits and of electromagnetism. He learns how electric flow depends upon an e.m.f., upon conductors and a closed path; how an electromagnet is formed; and how an iron core increases the effectiveness of the magnetic field. He is initiated into the principles of the electric arc, and he uses the essentials of insulating, of winding, and of soldering.

Since this electric pencil utilizes an electric arc to burn inscriptions into metal, it is very practical for marking tools. It has several advantages of structure and design: (1) It is made of standard-sized fiber and copper tubing, and of iron rod. (2) It may be held naturally in the hand while writing. (3) The bulk of the weight, and the heat from the winding are *above* the hand. (4) The electrode (No. 16 copper wire twisted until hard) may be lengthened as it burns down, simply by pulling it out of copper tubing.

First secure the piece of ½-in. o.d. (outside diameter), fiber tubing, and bore a 1/16-in. hole diametrically through it, ⅛ in. from one end. Be sure tubing is perfectly smooth on its inside. Next, lay out a 1½-in. fiber disk, and bore a ½-in. hole through its center, and a ⅛-in. hole near the edge. Glue this disk to the tubing as shown in Figure 1.

While the glue is drying, cut a piece of ⅜-in. o.d. fiber tubing, 4½ in. long and a piece of ¼-in. o.d. fiber tubing ⅜ in. long. Assemble these two pieces as shown in Figure 1. Then file or grind the two to a point and drill the ventilation holes. This completes the "grip" unit.

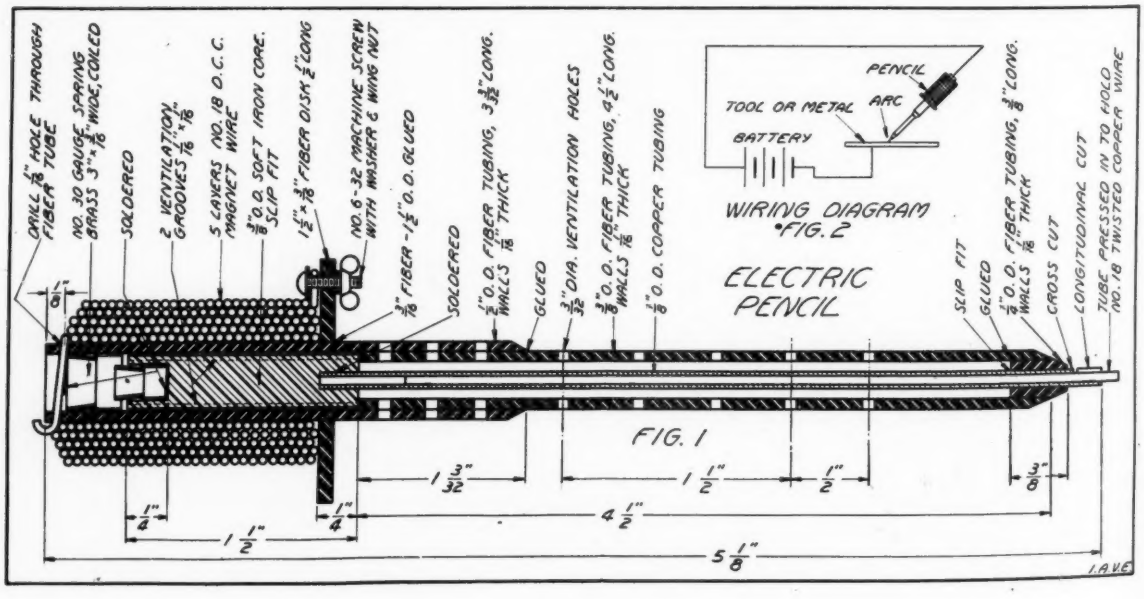
Cut a piece of ⅜-in. diameter soft-iron rod 1½ in. long. File or grind it down until it slips easily through the ½-in. fiber tubing. With a hack saw, cut two grooves lengthwise and opposite each other, about 1/16 in. deep, for air circulation. Drill a ⅛-in. hole in the center of one end and ¼-in. hole in the other end, each hole to be ¼ in. deep. Coil a piece of 30-gauge by 3/16 by 3-in. spring brass into a small spiral. Solder small end of spring into larger hole in iron rod (see Fig. 1). Next cut a piece of ⅛-in. o.d. copper tubing 5⅛ in. long. About ¼ in. back from one end make a hack-saw cut almost half through the tubing. Split lengthwise from this cut to the end of the tubing. Solder the tubing in the iron rod, being careful that the two line up closely. Cut a piece of No. 16 bare copper wire about 6 in. long. It may be twisted by placing one end in a vise and the other in a hand drill. Twisting makes the copper hard and stiff. Clip off untwisted ends and insert wire in copper tubing. Press tubing firmly to hold wire. The armature is now completed.

Now the coil may be wound. Scrape one end of No. 18 double cotton covered magnet wire bright, and insert it through the small hole drilled through the ½-in. fiber tubing. Then carefully wind on five layers of the magnet wire. Notice that drawing and illustrations show that end of winding is "banked"; that is, each succeeding layer is dropped back. Scrape the end of the wire clean and fasten it under a machine screw, to which is attached a wing nut or a Fahnestock clip. This completes the "field" unit.

Insert the armature into the field unit and place the "grip" unit in position. The armature should move freely back and forth. Solder the spring brass to the end of the winding. Glue the "grip" unit in place.

To operate, connect wires as shown in the wiring diagram, Figure 2. Use an ordinary car battery or connect to the 6 to 8-volt terminals of a transformer. (Use not less than a 50-watt transformer.) Press tip of pencil *lightly* to the tool to be marked and a series of arcs will result. With a little practice you will be able to write rapidly and naturally. Drawings and stencils on metal may be made. Surprisingly attractive portraits and scenes may be drawn upon sheet aluminum and copper. In this way metal vases, book ends, and similar articles may be decorated.

As the tip burns down, pull it out of the copper tubing.



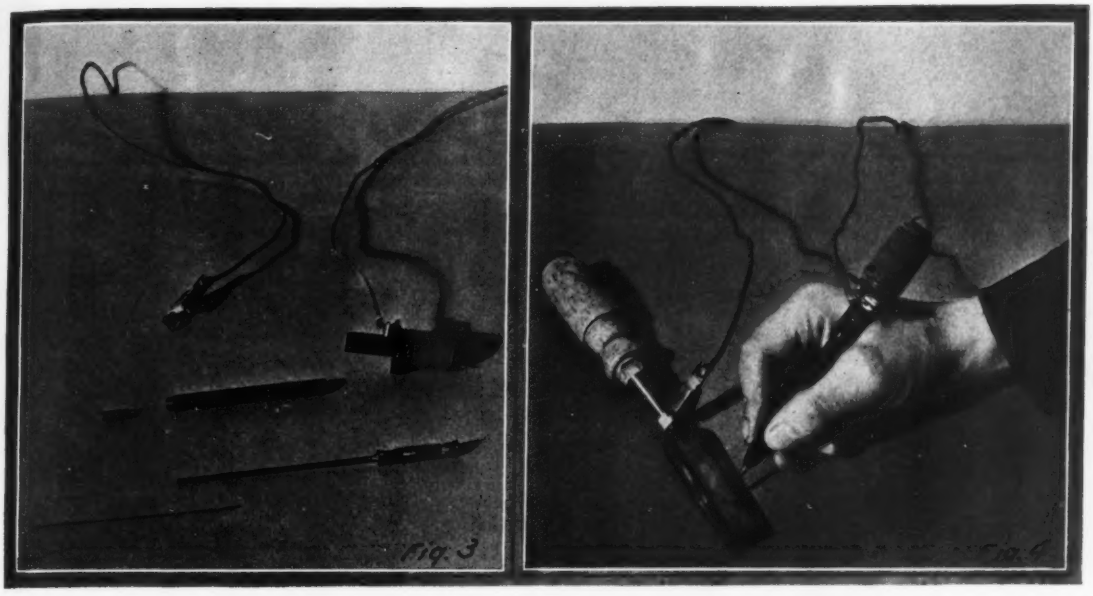


Fig. 3. Disassembled view of pencil parts. Fig. 4. Electric pencil in operation

GATE-LEG TABLE

V. L. Pickens, Supervisor Industrial Arts, Kansas City, Missouri

SPECIFICATIONS FOR MAKING GATE-LEG TABLE:

Wood: Honduras mahogany.
Construction: Dowel joints used throughout.
Preparation for finish: Legs are sanded on the lathe; sponged lightly and sanded the second time. All remaining parts are sponged and sanded.
Finish: Dark mahogany; dull-rubbed varnish finish.

1. Sand with Nos. ½, 1/0, 2/0, and dust.
2. Sponge. Sand with No. 5/0. Dust.
3. Stain with dark mahogany water stain. Have stain warm.
4. Sand lightly and dust.
5. Fill with paste filler.
6. Sand lightly and dust off carefully.
7. Give coat of four-hour varnish reduced with turpentine 20 per cent.
8. Sand carefully with No. 7/0 sandpaper. Clean with a tacky rag.
9. Give second coat of varnish. Apply it just as it comes from can.
10. Sand carefully with No. 5/0 paper and water. Wash with water and clean with chamois.
11. Give third coat and repeat operation of No. 10.
12. Give fourth coat and rub down with No. 8/0 sandpaper and rubbing oil. Clean with gasoline and polish with any good furniture polish.

Bill of Material (see dimensioned illustration).

LEARNING UNITS IN MAKING GATE-LEG TABLE:

The numbers of the learning units given correspond to those in the A.V.A. list for woodworking. The list under A and B represent the learning units needed to make the table with the hand tools and the lathe. The additional units may be taught if other machines are available:

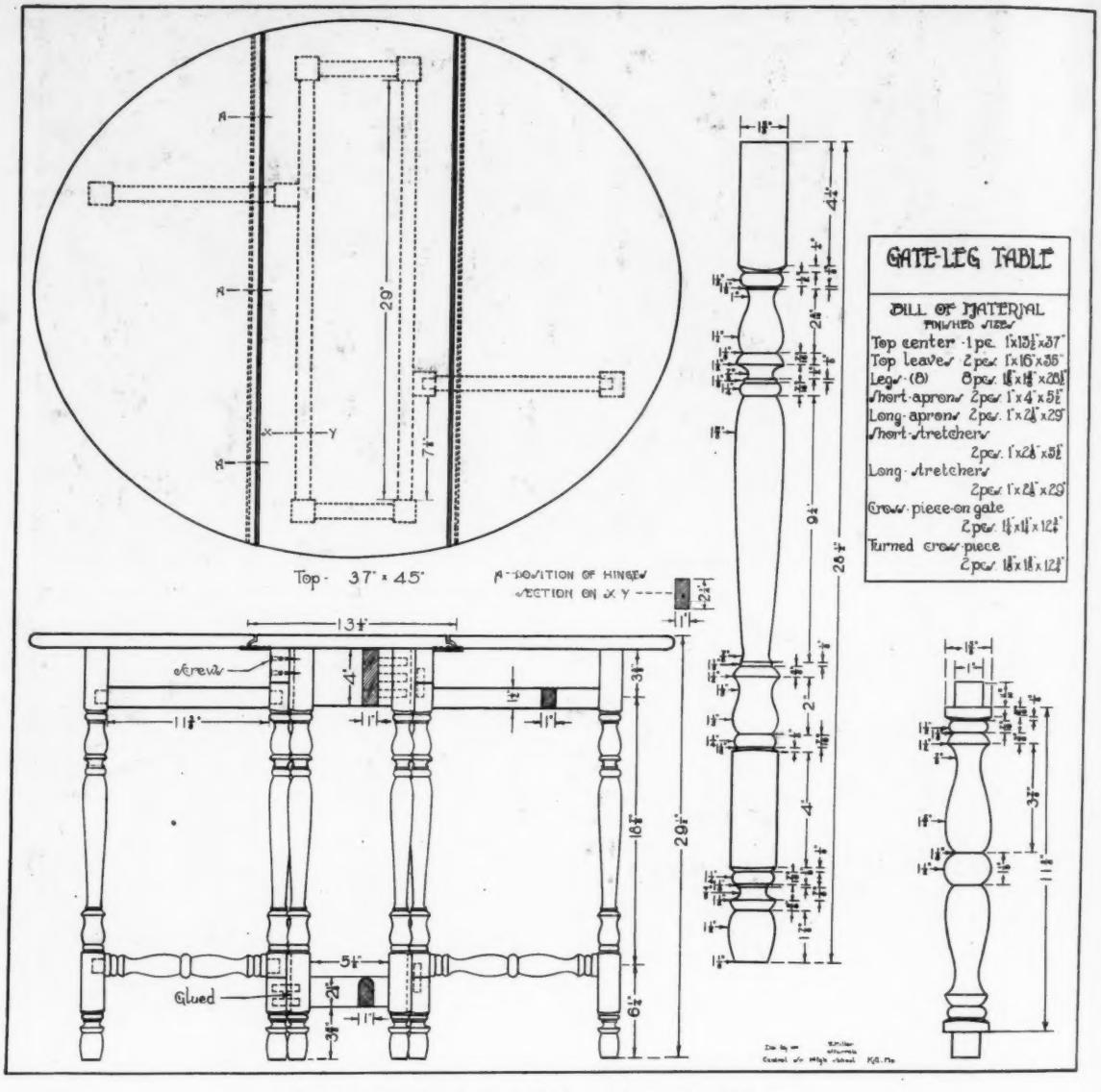
A. 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 23, 24, 25, 26, 27, 28, 29, 30, 34, 35, 36, 40, 43, 45, 46, 47, 50, 52, 53, 55, 59, 60, 72, 73, 80, 87, 91, 93, 95, 97.

Gate-leg table

B. Lathe: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 17, 19, 20, 27.
C. Jointer: 1, 2, 3, 4, 6.
D. Circular saw: 1, 2, 3, 4, 5.
E. Band saw: 1, 2, 3, 4.
F. Surfacer: 1, 2, 3, 4, 5, 6.
G. Sander: 1, 2, 3, 4.

JOB PLAN FOR MAKING GATE-LEG TABLE:

1. Make out bill of material.
2. Get material and check it.
3. Pick best wood for top and glue it up.
4. Square all pieces to dimension.
5. Make templates for leg and lower cross piece for gate.
6. Turn legs and cross pieces.
7. Cut aprons and rails to exact length.
8. Locate and bore holes for dowels and screws.
9. Number all parts.
10. Assemble central portion of table.
11. Fasten inside leg for each gate to table as shown in drawing. Do not use glue for No. 11.
12. Locate and mark where gate legs are to be cut.
13. Remove and cut legs.


GATE-LEG TABLE
BILL OF MATERIAL
FINISHED SIZES
Top center - 1 pc. 1"x13½"x37"
Top leaves - 2 pcs. 1"x16"x35"
Legs - (B) 8 pcs. 1⅜"x1⅜"x28½"
Short aprons - 2 pcs. 1"x4"x5½"
Long aprons - 2 pcs. 1"x2½"x29"
Short stretchers - 2 pcs. 1"x2½"x5½"
Long stretchers - 2 pcs. 1"x2½"x29"
Crow piece on gate - 2 pcs. 1¼"x1¼"x12½"
Turned crow piece - 2 pcs. 1⅜"x1⅜"x12½"
Top - 37" x 45"
POSITION OF HINGES
SECTION ON X Y
Screws
Glued

Gate-leg table details. V. L. Pickens, Kansas City, Missouri

14. Locate and bore holes for dowels on which the gates pivot.
15. Glue up gates.
16. Fasten gates to table with dowels and screws as shown in drawing.
17. Make rule joints on table top.
18. Fasten each leaf to center part of table with three table-top hinges.
19. Lay out ellipse and saw to line.
20. Shape edge of top.
21. Fasten top to table.
22. Finish (see specifications).

HOMEMADE SOLDERING EQUIPMENT FOR THE GENERAL SHOP

M. L. Byrn, Assistant Professor of Vocational Education, University of Michigan, Ann Arbor, Michigan

Soldering is an art seldom mastered by pupils in the school shop. It is, however, one phase of the work in the general shop in which anyone may become proficient provided suitable equipment, and proper techniques are used. Most of us still cling to the old soldering copper for soldering in the school shop. The torch method of soldering is nevertheless far superior to the soldering copper method in speed, ease of operation, and in appearance of the finished product. The torch is indispensable for pewter work and fine work in art metal. Once a pupil has learned to do soldering with the torch, he never wants to use the soldering copper again, excepting where the torch method cannot be used for some reason.

When we began using the torch for soldering, each pupil had a short length of glass tubing which he inserted in the end of the air hose, and through which he blew to furnish the necessary oxygen. It is surprising how little breath it takes to do a soldering job of reasonable size. Later, we soldered a small air cock on the end of the valve stem of a good-sized spare tire, after first removing the valve. It is very easy to release just the right amount of air for such delicate soldering as was necessary for the creamer and sugar bowl shown in Figure 1. Observe in this figure how the gas hose is attached temporarily to the gas line in the rear of the soldering furnace. (Note also

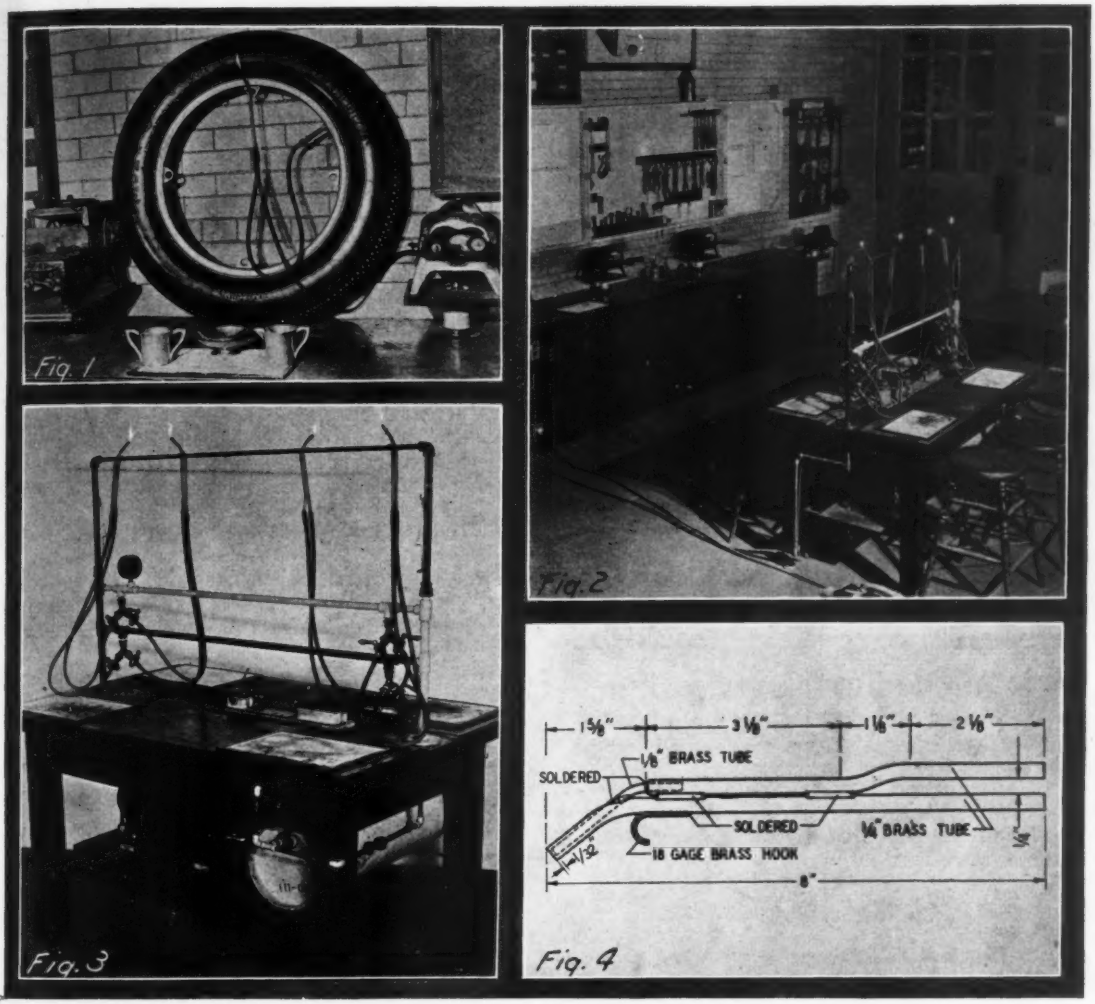


Fig. 1. An improvised air-pressure tank. Fig. 2. Experimental soldering bench equipment used in the general shop of the University High School, Ann Arbor, Michigan. Fig. 3. Improved soldering bench with pressure-stat (made of a small bicycle pump) to start and stop pump shown underneath. This device maintains the pressure between four and twelve pounds. Fig. 4. Home-made soldering torch

how the furnace is raised about four inches off the soldering bench by means of a 3 by 3½-in. nipple and two floor flanges to facilitate the problem of keeping the soldering bench clean.) One filling of the tire to about 60-lb. pressure will furnish sufficient oxygen to solder the sides and bottoms for the pewter pitchers shown in the illustration. Of course, the air must be used sparingly. This method was a real improvement over the mouth-blowing attempt.

Figure 2 shows the next development of the gas soldering unit in our shop. A small air compressor was purchased for a few dollars from one of the local junk dealers and mounted on a platform under the table. This was hooked up to a small tank. A pressure-stat was made from a coil spring, a small bicycle pump, a tumbler switch, and a few pieces of No. 16 gauge brass strips. This pressure-stat was extremely reliable, keeping the pressures at any desired amounts by simply adjusting the connecting arm up or down for a narrower or wider range of pressures. Details of this pressure-stat will be drawn up and included in a later article.

Figure 3 is a close-up view of the unit showing the pressure-stat, air gauge, air cocks, and the methods used to hang the torches out of the way when not in use. Four asbestos soldering pads also are clearly shown. These pads are made from ¼-in. asbestos and are far superior to slate or marble because they do not chill the joint when soldering. A frame of 18-gauge black iron was used to hold the pads in place, the frames were fastened to the table with screws. The lower horizontal pipe (painted red) is for gas; the pipe above with the pressure gauge (painted gray) is for air. Several schools adopting this method of soldering have procured junk pressure tanks for air and have either installed a discarded air compressor or pump the tanks up once a day with a large foot pump. Where a pressure-stat is not available, the amount of air used is regulated by means of the air cocks. A pressure-stat, if one does not care to make it, may be bought for about six or seven dollars.

Figure 4 is a detailed drawing of the torch. This torch was made from discarded copper or brass tubing. The tubing may be procured at any automobile wrecking establishment. We like the brass tubing better than copper as it is stiffer and seems to stand up better. The details are sufficiently clear that directions for manufacture are unnecessary. We find this torch especially fine for brazing band-saw blades up to 1 in. in width.

A word of caution when using the torch method for the first time may save the operator considerable trouble. The

most common mistake in using the torch is in adjusting the flame to produce too much heat. Use only enough heat to bring the metals to be soldered slightly above the temperature of melting solder and allow the heated metal to melt the solder rather than depend on the flame for melting. Too much heat will oxidize thin metals and interfere with the soldering operation.

When soldering thin pewter or small pewter objects, a very soft, bushy flame should be used. In general this flame should not be much over 5/16 in. in width, nor more than ¾ in. in length. Keep the flame moving backwards and forwards over the joint until the metal is hot enough to melt the solder. Most pewters melt at about 470 deg. F., while the regular pewter solders (67 per cent tin, 33 per cent lead) melt at approximately 358 deg. F. Since the melting points are so close together, great care must be exercised when soldering pewter. A little experience on some pewter scrap will give confidence in the art of pewter soldering, however.

As a flux for pewter, bright tin, copper, brass, and even lead, we have found one composed of about 75 per cent glycerine and 25 per cent hydrochloric acid to be very useful. Galvanized iron can be more easily soldered with a flux made of 50 per cent glycerine and 50 per cent acid.

Some Questions Answered

REFINISHING A PIANO

977. Q.: The superintendent has asked me to refinish a grand piano which is here at the school. What procedure should be used in the refinishing? — *C.S.B.*

A.: Your superintendent has given you a real job. However, this is a first-class chance to justify your department, and, as such, is not to be neglected. The following specifications will be suited to your work:

1. Secure a small, well-lighted room, heated to 80 deg. F. over a 24-hour period, as the room must not get cold during the night.

2. Get a ½-gal. of high-grade varnish remover, a gallon of denatured alcohol, a pound of 6/0 steel wool, wide and narrow flexible putty knives, several newspapers torn in quarter sheets, some clean rags, 12 sheets of 4/0 and 6/0 double-surfaced garnet finishing paper, and a gallon of water stain of the desired shade.

3. Remove the piano to a clean shop and take off the drop cover. Remove the hinge. Next, remove the drop front and keyboard drop. Use a double-thick kraft paper to cover the keyboard so that no material can get on or between the keys. Lay all loose parts of the case on padded horses which have the pads covered with heavy kraft paper to prevent marring the veneers.

4. Apply varnish remover with a wide brush, in one-way strokes only. Let stay for about 3 minutes to allow the remover to strike. Then use a wide putty knife (flexible) which has had its edge carefully smoothed on an oilstone, to carefully strip the old finish. Use the torn newspaper to wipe the knife free of sludge at the end of the strokes. Keep the work neat. Continue until the panel is clean.

5. Next, wash all the stripped surface with denatured alcohol and steel wool, working with the grain only. Wash again with clean alcohol and rags to remove all traces of the old finish. Repeat until the entire case has been cleaned of the old finish. Let dry overnight.

6. Sand the entire job with a split 4/0 paper and felt block to a clean, bright surface. Take out all scratches, etc. Spot-glue any blisters and fill any dents with stick shellac of the proper color. Resand.

7. Apply a wet coat of the proper color water stain and let dry overnight. Check for any streaks, etc.

8. Apply a coat of shellac size made from orange shellac reduced with four parts of denatured alcohol and added to an equal volume of shellac-mixing lacquer. Apply with either spray or fitch brush. Dry and sand with a split 6/0 garnet finishing paper.

9. Dust off and fill with a properly colored silex base filler, running about 10 lb. of base per gallon of filler thinner. Dry 48 hours in a warm room.

10. Use the old 6/0 paper from step No. 8 to even up any filler clouds which may appear on close inspection. Dust off the case very carefully and then take into the small room spoken of in step No. 1.

11. Sprinkle the floor lightly with water to hold down dust and then apply a well brushed out coat of a high-grade four-hour varnish. It is not necessary that piano polishing varnishes be used, since these are very tricky to apply and the other type will last longer with all the polish necessary. Dry 24 hours, nevertheless.

12. Sand thoroughly with a split 6/0 paper and a felt pad. Dust off carefully and follow with the tack rag just ahead of the varnish brush. Pick the second coat of varnish carefully. Let dry 24 hours at 80 deg. F.

13. If the work is clean and free of sags, then use water and a 6/0 "wet-or-dry" paper with felt pad to cut the surface down to a true level. Dry and tack off.

14. Revarnish. Dry two days and water-rub with felt pad, water, and FFF pumice stone to a perfect surface. Let dry overnight after washing and sponging clean.

15. Water-polish with rottenstone and a new, clean, rubbing felt. Let the powder dry on the job, then use a clean cotton-flannel pad, dampened in water to rub the last of the rottenstone off the surface.

16. Use the rottenstone and alcohol to repolish all hinges and trim to a new bright surface. Wipe clean and screw them back in place. Oil all hinges, wipe.

17. Use a clean cotton flannel to apply a good oil polish and clean up the entire job. Have inspected before removing to its final location. — *Ralph G. Waring.*

USING SHELLAC-MIXING LACQUER FOR FINISHING

981. Q.: Will shellac-mixing lacquer make a satisfactory and lasting finish when used exclusively for the finishing coats? I might explain that I am an amateur and find the lacquer much easier to handle than varnish. — *L. J. S.*

A.: You will find the shellac-mixing lacquer a very satisfactory finish for the entire schedule. It not only brushes and flows easily, but in addition sands and rubs splendidly to a fine finish which has much durability. I fail to see, however, why you should have any trouble with the newer four-hour varnishes which are ideal for both professional and amateur brush hands. Perhaps if you will study the chapters on using the above materials, as well as the one on brushing practice, in *Principles of Mill and Paint Shop Practice,* published by The Bruce Publishing Company, Milwaukee, Wis., you will find your troubles much less pronounced. — *Ralph G. Waring.*

WATERPROOFING CLOTH

982. Q.: I have a large balloon-cloth wagon cover that was originally treated with a waterproofing compound. The cover became very dirty through use and I had it laundered. Naturally the waterproofing washed out of it. I am wondering if you can tell me what to use on it and whether we can make up the waterproofing ourselves. — *G. W. S.*

A.: In handling a problem of this kind you have two alternatives, the choice of which will depend upon the time and equipment available.

1. Soak the cloth in a 7-per-cent solution of gelatine, which in this case may be a good grade of pale glue, at 104 deg. F. Wring dry and let dry completely. Next, pass through a 4-per-cent solution of alum. Dry again. Rinse in clear water to remove by-products of the reaction, wring out and dry once more before using.

2. Stretch the cloth as completely as possible, after which apply a thoroughly brushed-out coat of spar varnish, or the new 4-hour varnishes reduced with four parts of turpentine. Do not have the varnish any thicker than this or the cloth will become too stiff to handle. — *Ralph G. Waring.*

New Publications

Instruction Sheets for the General Shop

By Melvin S. Lewis and John H. Dillon. Paper, 5⅞ by 9, illustrated. Price, 50 cents. The book on "Electricity" contains 91 pages; and the book on "Drafting" 157 pages. Published by McGraw-Hill Book Company, New York City.

The electricity material has been arranged to be used as core instructional material in the unit of electricity in the general shop. It embraces 10 separate jobs which all have carry-over value in work that may arise in the home.

The booklet on drafting has been arranged with the same idea in mind. It contains 12 jobs for the industrial-arts student. Drawings for woodworking and machine-shop projects, and some architectural applications comprise the work.

Design: Its Fundamentals and Applications

By Florence G. Bush and Frances Welbourne. Cloth, 306 pages, 5½ by 8, illustrated. Price, $1.90. Published by Little, Brown, and Company, Boston, Mass.

This comprehensive book contains a great deal of practical information on the problem of design as related to homemaking activities. The assignments are divided into groups on the A, B, and C levels, the C group being an activity which entitles the student to a grade of "fair," the B activity to a grade of "good," and the grade of "superior" for activities in the A group.

The book is divided into three units. These units are devoted to fundamentals of design, the costume, and the home.

General Shop and Household Mechanics. Paper, 44 pages. Price, 50 cents. Industrial Arts Monograph of the Michigan State Board of Vocational Education, Lansing, Mich. The monograph, prepared by a special research committee of the Michigan Industrial Education Society, presents material containing practical suggestions and numerous illustrations to help the progressive teacher in developing this type of work. The report shows the trend toward the general shop, the type of subjects offered, the number of periods devoted to the subject, and the objects to be attained through the general shop.

Elementary Industrial Electricity — 2nd Edition

By L. Raymond Smith. Cloth, 287 pages, 4¾ by 7⅝, illustrated. Price, $2. Published by McGraw-Hill Book Company, New York City.

This volume is the third of a series on industrial physics. It is devoted to direct-current electricity and contains a large number of very practical mathematical problems which will be found useful both by the student of electricity or by the practical electrician who wants to study the mathematical side of his trade.

The Secret of Selling Yourself

By Bert Hillyer. Paper, 15 pages. Published by The Hillyer Company, River Forest, Ill.

Not everyone can be a salesman. Some people do not care for the work, while others do not possess the necessary qualifications, and are not capable to be salesmen.

This little booklet sets forth in a simple way, plans and methods which anyone can follow in preparing himself as a salesman of his own personality. The booklet lists 21 rules for making application for a position. It tells just the kind of sales ability which every man and woman must have in order to get ahead.

Trailer Engineering

Passenger car trailer design. By Ray F. Kuns. Paper, 48 pages. Price, $1.00. Published by Trotwood Trailers, Inc., Trotwood, Ohio.

This booklet is the result of wide experience in the design, construction, and operation of automobiles and automobile trailers. It contains the answer to numerous questions raised by trailer enthusiasts and others, and will be of particular interest to those interested in building or buying trailers for their own use.

The book begins with a brief history of the use and development of trailers; and then takes up fundamentals of car trailer design; car trailer coaches; furnishings and fittings; the selection of designs for a trailer coach; building of the Trotwood clipper; and a question and answer section on trailer use, design, and engineering, and lighting outfits.

Personal News

DEATH OF JOSEPH J. EATON

Joseph J. Eaton, principal of the Saunders Trade School, Yonkers, N. Y., since its establishment nearly a quarter of a century ago, passed away on April 19 at his home, after a two-months' illness due to a heart ailment. Mr. Eaton was 61 years of age. He was a native of Boston and a descendant of a New England family which antedated the American Revolution.

JOSEPH J. EATON

After graduating with honors from the Rindge Technical School of Cambridge, Mass., he matriculated at Harvard University and was graduated from that institution in 1896 with the bachelor of science degree in engineering, *magna cum laude*. Later he took his M.A. degree from Columbia University, and when he was taken ill several months ago, he had completed his final dissertation, "Twenty-Five Years of Vocational Education," which he was to present for the doctor of philosophy degree from Fordham University.

Joseph Eaton embodied many of his ideas and ideals affecting vocational education into the Saunders Trade School, the first school of this type in New York state. He may be called a real pioneer in the extensive field of vocational education and vocational guidance. The groundwork for his extensive knowledge of this field lay in a teaching experience obtained both in the United States and in the Philippines.

Despite a busy life, Mr. Eaton found time to write books and articles for his professional fellow-workers, in which he consistently stressed the vocational benefits to be derived through vocational training.

Associations, Conventions

MICHIGAN INDUSTRIAL EDUCATION SOCIETY CONVENTION

The convention held at Battle Creek, Mich., by the Michigan Industrial Education Society, April 20 and 21, 1934, again demonstrated what can be done by men who are interested in their profession, who know the value of united action and counseling, and who are able to intelligently organize a program that will be beneficial to all who attend.

The meetings were all well attended, and time schedules which evidently mean something to this hard-working association of shop teachers, were closely adhered to.

For Friday morning, trips through the Vocational School, the Ann J. Kellogg School, and through some interesting plants, were scheduled. At noon the Postum Company, Inc., gave a complimentary luncheon, after which the first general meeting was held. Dr. W. G. Coburn, superintendent of schools of Battle Creek, welcomed the Association. He pointed out that cities must institute their educational work so as to take care of all of the children, whether they belong to the ability group, the normal group, the remedial group, or to the children that need special courses. If such education is not

available, many children under present conditions will be driven to lives of crime. Mr. Paul L. Cressman, assistant state superintendent of public instruction, in his response, said that the easiest way is to train students to live as the past has lived, but that the problem that confronts present-day educators is to train the student of today to live in the world of tomorrow.

Mr. Lee Lamb pointed to the fact that industrial-arts teachers must aim to broaden their education. They must be able to answer the question whether industrial arts should be prevocational, exploratory, or whether it contributes to cultural education or has avocational worth. They must be able to show how their subject contributes to the social education of children, what guidance values it has. They must make better occupational analyses of their communities and organize their work so that even though their classes be enlarged, they can teach the students efficiently. He also emphasized the fact that industry requires and demands students with I.Q.'s of 120 or over, and that they will no longer be satisfied with the children of the low I.Q.'s or those that will not apply themselves in school.

At the Jury Panel meeting, the subject of program of classes for students desiring education of less than high-school graduation level and who desired to enter upon work as early as the law permits, was discussed. Mr. A. C. Tagg, director of vocational education, Fordson, Mich., was the chairman, and Earl L. Bedell, assistant director of vocational education, Detroit, led the Jury Panel discussions. Mr. K. G. Smith, state supervisor of industrial education, summarized the findings of the Jury that for the best interests of students of the type discussed, instructions should be given in separate institutions, that the teachers of such a school must be earnest, hard-working, sympathetic individuals, and that the courses offered must be flexible enough to be easily adapted to student needs.

At the annual dinner and dance held Friday evening, George P. Hambrecht, state director of vocational education of Wisconsin, pointed out the fact that taxpayers throughout the country are continually harping on the rising cost of education. They evidently overlook that the cost of conducting industry also is rising. The plants erected 20 and 30 years ago were cheaper when compared to those that are now erected for carrying on the same type of industrial work. He pointed out that viewing costs without recognizing the value of the service rendered is good for nothing. The United States pays upward of $13,000,000 a year for its efforts to reduce crime. It costs nothing to train criminals in crime. It were better that this huge amount were spent in training children to follow useful lives rather than let them drift into the paths of the incompetent and evildoers.

Dr. Paul F. Voelker, state superintendent of public instruction, Lansing, emphasized the need of increasingly expanding the guidance factor in all educational endeavors. He said that teaching the don't is not as good as to develop interests that make wrongdoing repugnant or impossible, and that in this work, the shop teacher through shop activities probably can do more than most teachers in guiding character development.

Mr. Malcolm G. Little, Civilian Adviser for Education, headquarters 6th Army Corps Area, Chicago, Ill., explained the educational program which the government is trying to institute in the CCC camps.

The activities Saturday morning started with a seven o'clock breakfast immediately after which the divisional meetings started. These were all well attended, and it was interesting to note that most speakers had provided themselves with mimeographed outlines, bibliographies, drawings, etc., that could be distributed to the audience.

At the general-session luncheon, Mr. John J. Scannell, secretary of State Federation of Labor, discussed "What Shall We Do with Boys 15 to 18 Years of Age?" and Mr. Duncan C. McCray, ex-assistant prosecuting attorney of Wayne County, Detroit, Mich., discussed "Crime and Its Relation to Education." At the business meeting which followed the luncheon, Mr. Harry Burnham, supervisor of industrial arts, Flint, Mich., was elected president, and Mr. D. B. Fox, High School, Jackson, Mich., was elected vice-president of the organization.

An interesting Ship program, presided over by first mate John Claude of The Bruce Publishing Company, followed.

MARCH MEETING OF MASSACHUSETTS INDUSTRIAL-EDUCATION SOCIETY

The monthly meeting of the Massachusetts Industrial-Education Society was held Saturday, March 24, at the Hotel Westminster, Boston.

The meeting took the form of a round-table session, with a discussion on the subject, "Why Manual Arts Should be Taught in the Public Schools," led by Mr. Joseph Sandberg, assistant director of manual training in the Boston schools. He pointed out that manual training develops handiness, initiative, and resourcefulness, and provides a means of developing technical skills and aids in the discovery of special interests and aptitudes. Practical shop methods and industrial content, he said, are incentives to keep boys in school. — *Louis A. Van Ham.*

SPRING MEETING OF THE ILLINOIS VOCATIONAL ASSOCIATION

The spring meeting of the Illinois Vocational Association was held March 30 and 31 at Urbana, with approximately 600 persons in attendance. The meeting was held in conjunction with the Illinois Vocational Agriculture Association.

The program was exceptionally good and the papers and discussions attracted a good deal of attention. Prof. A. F. Siepert, Bradley Polytechnic Institute, was chairman at the industrial-arts round-table luncheon held in Bradley Hall. The general speaker on this occasion was L. F. Ashley, of the Eastern Illinois State Teachers College, Charleston. He spoke on "The State Association and the Round Table." The representatives of seven of the state district round tables also made short addresses.

Sectional meetings in woodworking, drafting, metal working, printing, general-shop work, home economics, art education, business education, part-time education, and vocational guidance also were held.

Prof. Arthur B. Mays of the University of Illinois, was toastmaster at the annual banquet held in Bradley Hall Friday evening. At this time Dean Rexford Newcomb of the College of Fine Arts at the University of Illinois; L. H. Dennis, executive secretary of the American Vocational Association, at Washington, D. C.; and Dr. A. W. Nolan, head of the department of agricultural education at the University of Illinois, addressed the assemblage. William J. Bogan, superintendent of the Chicago public schools, and Francis G. Blair, state superintendent of public instruction, Springfield, Ill., spoke at the general session.

At the business meeting, the following were unanimously reëlected for the ensuing year: President, N. F. Fultz, vocational director of Cicero, Ill.; secretary, L. F. Ashley, Eastern Illinois State Teachers College, Charleston; assistant secretary, Orville A. Oaks of Evanston; and treasurer, L. J. Lease, vocational director of the Thornton Township High School, Harvey.

Epsilon Pi Tau Installs New Chapters

The Lamda chapter of the Epsilon Pi Tau Fraternity was installed at Ohio University, Athens, by the Alpha Chapter of Ohio State University, Columbus, on April 28, 1934. The Mu Chapter will be installed at Indiana State Teachers College, Terre Haute, on May 26, 1934.

The Epsilon Pi Tau Fraternity is the national honorary industrial-arts fraternity. Its headquarters are located at the Ohio State University, Columbus, Ohio.

IOWA STATE INDUSTRIAL-ARTS TEACHERS MEET AT FAIRFIELD

The teachers of the industrial-arts section of the Iowa State Teachers' Association, southeastern division, held their regular meeting on April 7, at Fairfield, with an attendance of fifty members.

Following the usual noon luncheon, the visiting teachers assembled in the plant of Heston and Anderson, manufacturers of woodworking machinery, where the afternoon meeting was held. Mr. L. R. Heston, gave an interesting talk on "Inexpensive Woodworking Machinery for the Small Shop," tracing the beginning of the use of the heavier types down to the more modern machines of the present day.

W. C. Wood, of Davenport, assisted by Roy McLain, talked on bent metal and its use in the Davenport schools. He displayed problems and drawings used in the classes of his school.

Ross Cramlet, of Des Moines, outlined his plans for the state meeting next fall, at Des Moines.

The remainder of the program was devoted to a round-table discussion, and a trip through the factory where a demonstration of the firm's line of woodworking machinery was given.

The next year's meeting will be held in the spring of 1935, in connection with the regular state association convention. — *Glenn H. Osborne.*

INDUSTRIAL-ARTS CONFERENCE AT STOUT INSTITUTE

The regional conference of industrial-arts teachers, held on April 7 at The Stout Institute, Menomonie, Wis., attracted a large number of teachers and other school people from the entire northwest section of Wisconsin. The conference took the form of a joint meeting, in which the Wisconsin Industrial-Arts Association, the State Department of Public Instruction, and the Industrial-Education Section of the Northwest Wisconsin Teachers participated. Mr. A. J. Romeis, of Chippewa Falls, chairman of the Northwest Industrial-Education Section, opened the meeting. Forty-five persons attended the meeting.

Mr. J. F. Waddell, assistant state superintendent of schools, served as conference leader. The jury-panel method was used. Industrial-arts teachers representing the geographic range of the northwest section and interested in various forms of industrial-arts activities took part in the discussions. The conference centered around the Wisconsin philosophy of education and its relationship with the objectives of industrial arts as defined by the A.V.A. Committee on Standards of Attainment in industrial-arts teaching. These objectives were discussed in detail as they apply to the various activity divisions.

The conference this year marked the beginning of a new plan to hold two meetings each year in the northwest section of the state. The plans for the meeting were in charge of a local committee, consisting of Dean C. A. Bowman, Mr. F. E. Tustison, and Mr. F. L. Curran. — *C. A. Bowman.*

OSWEGO NORMAL BOYS MEET

The Oswego Normal Boys' Club held its annual meeting on Saturday, March 10, at the Hotel Lincoln, New York City. About 60 members were present from a radius of 200 miles from New York City. Dr. Joseph C. Park, of the Oswego Normal School, was the oldest graduate present, and Mark Hill traveled the longest distance to be present. Horace Baker and H. Blodgett were the youngest members present.

Dr. Ralph W. Swetman, head of the Oswego Normal School, spoke briefly at the meeting. Howard D. White, of the New Jersey State Education Department, was the principal speaker.

For useful services, the association gave prizes to Walter Church, S. Sozio, and Anthony Paluch.

The club elected Dr. Thomas Hopkins, Jersey City, as president; Robert Peterman, John Faber, and Fred Pelin, vice-presidents; Raymond Van Tassel, secretary; Walter Church, assistant secretary; and W. Ecker, treasurer.

ALABAMA INDUSTRIAL-ARTS CLUB MEETS AT BIRMINGHAM

The regular meeting of the Alabama Industrial-Arts Club was held March 23, at Birmingham.

Bill Young, a student of the Woodlawn High School, Birmingham, explained the purposes of the Home Craft Guild. Marvin Jones, of the same school, discussed Procedure Planning, and Lawrence Fullington, of Birmingham, talked on Hobbies. There was a round-table discussion, in which plans were made for the publication of a bimonthly paper for state industrial-arts teachers.

At the business session, the following officers were elected for the ensuing year: President, A. H. Wiltshire, Birmingham; vice-president, E. W. Walker, Dothan; secretary, W. H. Hackworth, Montgomery; treasurer, W. H. Stoves, Birmingham. — *W. H. Hackworth.*

(Continued on page 6a)

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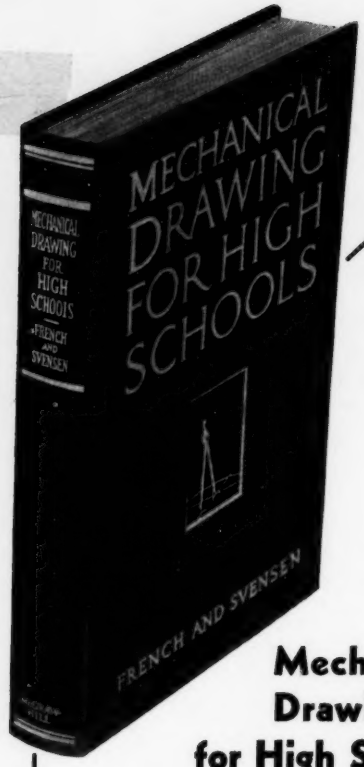

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(Continued from page 220)

A.V.A. TO MEET AT PITTSBURGH

The American Vocational Association convention will be held December 5 to 8, at Pittsburgh, Pa. This is the second time that Pennsylvania has been host to the Association, the first meeting having been held in 1926.

The headquarters for the meeting will be the Hotel William Penn, which is conveniently located for all meetings and within easy walking distance of the University and Carnegie Institute of Technology. The Connelley Trade School, one of the largest schools of its kind in the country, is in the immediate vicinity.

Arrangements for the meeting are going forward, under the direction of the section of vice-presidents, with the assistance of local coördinators. Teachers, supervisors, and superintendents, as well as college and university professors and administrators in the Pittsburgh district will act as chairmen of the various groups. Dr. Ben G. Graham, superintendent of schools of Pittsburgh, is chairman of the local committee on arrangements. — *Theodore A. Siedle.*

CONFERENCE ON PRINTING EDUCATION

A very interesting program has been arranged for the thirteenth annual conference on printing education, to be held June 18 to 20, at Detroit, Mich. The headquarters for the meeting will be in the Hotel Statler and all conference sessions will take place in the Cass Technical High School.

At the opening session, Mr. C. C. Means, of Detroit, will discuss "Printing, Yesterday and Today." Douglas C. McMurtrie will talk on the service of the pioneer printer in the development of culture in America. He will be followed by Fred W. Gage, who will talk on "The Graphic Arts in the New Deal."

The afternoon session which follows the luncheon, will be in charge of Mr. John A. Backus, of The American Type Founders Company. John Fintz will lead a discussion on research and survey, Chester Lyle will talk on "Printing Education Week," and Allan Robinson on "The Importance of Exhibits in a Program of Printing Education."

The Tuesday morning session, under the direction of C. Harold Lauck, will include a number of sectional meetings. Otto Fuhrmann will talk on "A Diagnosis of Teaching Problems." Maurice Forhert will close the session with a paper on "Teaching Design and Layout."

At the afternoon session there will be a joint meeting with the Detroit Club of Printing House Craftsmen. Mr. George K. Hebb will be toastmaster at the annual dinner in the Hotel Statler, and talks will be given by Frederick W. Goudy, Harry L. Gage, and Dard Hunter.

The Wednesday morning session will be in charge of David Gustafson. J. L. Frazier will discuss "The Needs of the Printing Industry"; Ira D. Pilliard will talk on "The New Demand in Craftsmanship," and J. Henry Holloway will speak on "What's Ahead in Printing Education?" A fourth speaker will take up the subject of direct color photography.

The meeting will close with tours to points of interest during the afternoon. — *H. H. Goodwin.*

News Notes

Vocational-Education Aid Bill Passes House

A Bill appropriating $3,000,000 a year for three years to aid vocational education, was passed by the House and is now before the Senate. The Bill requires states to match the federal contribution. The appropriations are to be devoted in equal amounts to agricultural education and to home economics and industrial training.

Better Times Coming

Several news items have reached our editorial offices showing that teachers' salaries have been raised. It is true, the increases in most cases do not reach the cuts that were made in teachers' salaries, but they do show that the trend is again toward better salaries for teachers.

The New Guildsman Magazine

The official magazine of the Fisher Body Corporation, Detroit, Michigan, known as *The Guildsman,* featured contributions by Karl T. Compton of the Massachusetts Institute of Technology, and Archibald L. Bouton, dean of the University College of Arts and Science, New York University, in its first issue, April, 1934.

The purpose of this Guild is to give boys an appreciation of the crafts, the self-assurance that comes with the development of skill, and an insight into the meaning of the word *craftsmanship.* The new publication goes to 750,000 members in the United States and Canada, their parents, teachers, principals, superintendents, Boy Scout leaders, and college and university heads.

Civil Service Examination

The U. S. Civil Service Commission has announced a competitive examination for the position of supervisor of secondary education in the Indian Field Service of the Department of the Interior. The entrance salary is $4,600 a year, subject to a deduction of 10 per cent until June 30, 1934.

Full information may be obtained from the secretary of the U. S. Civil Service Board of Examiners at the post office or customhouse in any city, or from the U. S. Civil Service Commission, Washington, D. C.